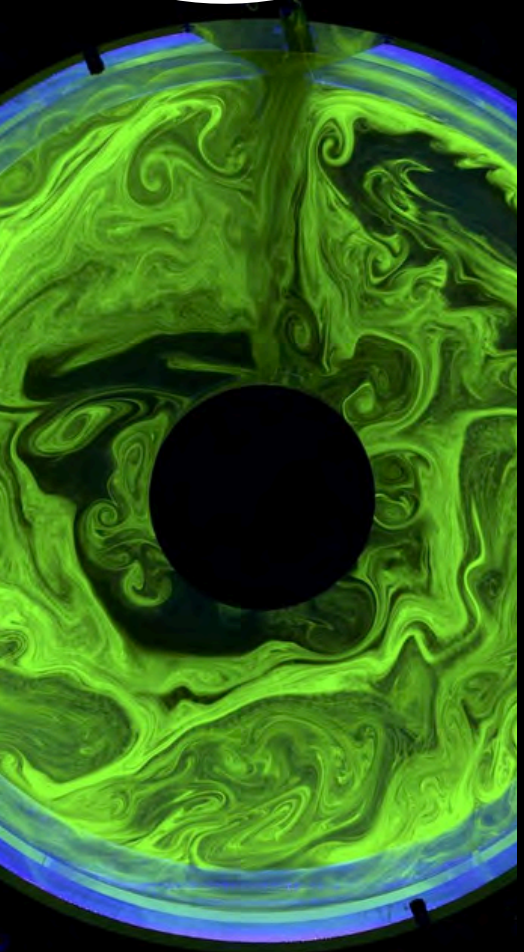
Australian National University

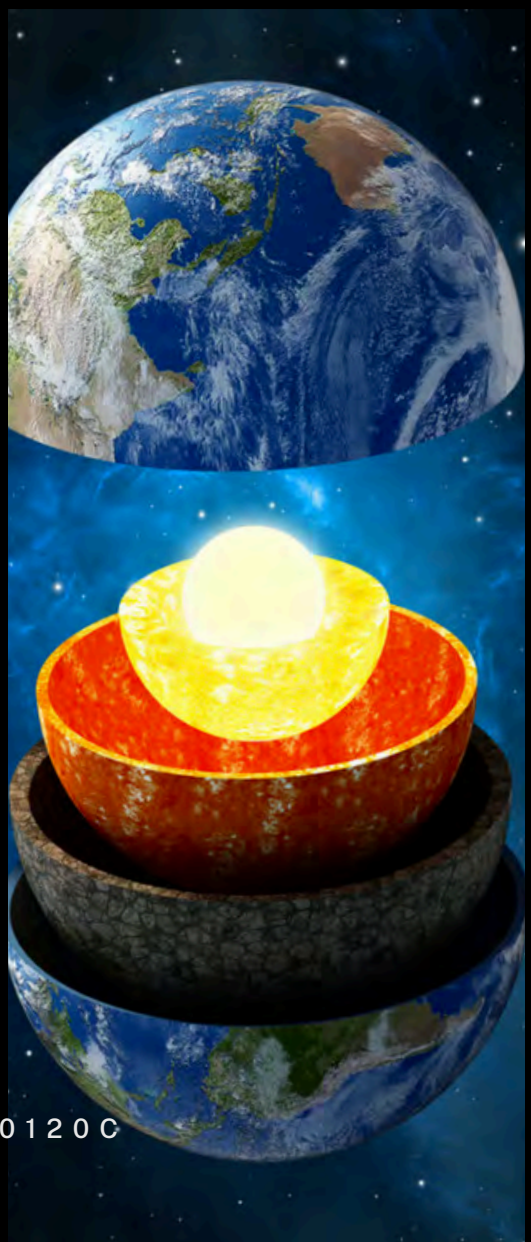
Research School of Earth Sciences

Research School of Earth Sciences

ANNUAL REPORT 2023

SCHOOL OF EARTH SCIENCES 50 YEARS 1973 - 2023







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Lake George 2023 - 1951. Credit: Brad Pillans





FROM THE DIRECTOR



Welcome to the 2023 Annual Report of the Research School of Earth Sciences (RSES) at The Australian National University.

2023 marked the 50th anniversary of RSES. Since its establishment in 1973, the School has grown into a diverse, internationally recognised research community, advancing our understanding of the Earth and its evolution.

This report highlights the achievements of our staff and students across research, education and engagement. I thank everyone who has contributed to the School's success over the past year.

This report highlights the achievements of our staff and students across research, education and engagement. I thank everyone who has contributed to the School's success over the past year.

As we celebrate 50 years of discovery, we remain committed to excellent fundamental research, educating future generations of Earth scientists, and addressing the major challenges facing our planet.
I hope you enjoy reading about our achievements in 2023.

Professor Dorrit Jacob FAA
Director Research School of Earth Sciences



STAFF LISTS

ACADEMIC STAFF

Director

D. Jacob, Dr. rer. nat. Georg August University Germany (equivalent PhD) Diplom in Mineralogy, Johannes Gutenberg Univ, Germany (equivalent MSc)

Associate Directors

Research & Engagement

N.J. Abram, BSc Advanced (Hons) Sydney, PhD ANU (to 31/03/2023)

D.R. Davies, MSci PhD Cardiff, UK (from 31/03/2023)

Higher Degree Research

S.J. Fallon, BA MS San Diego, PhD ANU

Education

M.J. Ellwood, BSc (Hons) PhD Otago (to 01/04/2023)

L.N. Moresi, BA (Hons) Cambridge, DPhil Oxford (from 01/04/2023)

Professors

N.J. Abram, BSC Advanced (Hons) Sydney, PhD ANU

A.J. Berry, BSc (Hons) Sydney, DPhil Oxford

J.J. Brocks, Dip Freiburg, PhD Sydney

D.R. Davies, MSci PhD Cardiff, UK

M.J. Ellwood, BSc (Hons) PhD Otago

S.J. Fallon, BA MS San Diego, PhD ANU

A.M. Hogg, BSc ANU, PhD UWA (on secondment to ACCESS-NRI)

P.L. King, BSc (Hons) ANU, PhD Arizona State

J.A. Mavrogenes, BS Beloit, MS Missouri-Rolla, PhD Virginia Tech

M.S. Miller, BA Whittier, MSc Columbia, MEng Cornell, PhD ANU

L.N. Moresi, BA (Hons) Cambridge, DPhil Oxford

A.P. Roberts, BSc Massey, BSc (Hons) PhD DSc Victoria HonFRSNZ (Wellington)

E. Rohling, BSc MSc PhD Utrecht (to 03/10/2023)

M.S. Sambridge, BSc Loughborough, PhD ANU, FAA, FRAS

H. Tkalčić, DipEng in Physics Zagreb, PhD UC Berkley

P. Tregoning, BSurv PhD UNSW

G.M. Yaxley, BSc PhD Tasmania

J. Yu, BSc MSc Nanjing University, PhD Cambridge

Associate Professors

O. Alard, PhD Macquarie, Habilitation Montpellier

M.A. Forster, BSc MSc PhD Monash

R. Hackney, BSc (Hons) ANU, MSc Victoria University of Wellington, PhD UWA - IODP/ANZIC Director

D.C. Heslop, BSc (Hons) Durham, PhD Liverpool, Dr. habil. Bremen

Adjunct Professor

P. Cummins, PhD Geophysics, U. California, Berkely

Fellows

C. Eakin, MSci Imperial College London, PhD Yale

A. Kiss, BSc (Hons) PhD ANU

C. Shakespeare, BSc (Hons) ANU, PhD Cambridge

Research Fellows

M. Anenburg, BSc MSc Ben-Gurion University of the Negev, PhD ANU
A. Burnham, MSci MA Cambridge, PhD Imperial College London
N.C. Constantinou, BSc MSc PhD Athens, Greece [ARC DECRA Fellow]
Y. Dai, BSc Peking University, China, PhD ANU (from 01/01/2023)
K. Grant, BSc Southampton, MSc JCU, PhD Southampton
M.J. Hoggard, BA MSci MA PhD Cambridge [ARC DECRA Fellow]
C. Holgate, BEng UNSW, M.Hydrology Vrije Universiteit Amsterdam, PhD ANU
W. Huneke, BSc MSc Kiel, PhD Tasmania
C. Jiang, BS and graduate study in geology China Univ of Geosciences, PhD Macquarie [ARC DECRA Fellow]
S. McKibbin, BSc (Hons) Newcastle, PhD ANU
F. Magrini, BSc MSc Milan, PhD Universita` Roma Tre (from 14/03/2023)
N. Maher, BSc (Hons) ANU, PhD UNSW [ARC DECRA Fellow]
L. Miller, MSc Imperial College London, PhD ANU (to 25/11/2023)
A. Morrison, BSc (Hons) ANU, GradDipEd Canberra, PhD ANU [ARC DECRA Fellow]
A. Purcell, BSc (Hons) PhD ANU
K. Stewart, BSc (Hons), PhD ANU
T.S. Pham, BEng Hanoi, Postgrad Dip Intl Center for Theoretical Physics, PhD ANU
L. Yang, BSc Ocean University of China, PhD UTAS (from 18/09/2023)
Q. Zhang, BSc Hebei Normal Uni, MEng CUGB, PhD Wollongong (from 06/11/2023)

Postdoctoral Fellows

W. Aguiar, PhD Federal University of Rio Grande (Brazil) (from 16/01/2023)
A. Casas Ramos, BChemEng Tuxtla ITTG, MGeochem (UNAM), Dr. rer. nat. Ludwig-Maximillans-Universitat Munchen
J. D'Andres, BSc MSc ETHZ, PhD ANU
T. Duvernay, BSc MSc Universite Paris Diderot
S. Eggins, BAppSci UNSW, PhD Tasmania
E. Ellison, BSc (Hons) Durham, MSc Southampton, PhD Imperial College London
G. Falster, BSc (Hons) PhD Adelaide
S. Ghelichkhan, BSc Tehran, MSc PhD Ludwig-Maximillans-Universitat Munchen
V.H. Lai, BA UC Berkeley, MSc PhD California Inst of Technology
X. Ma, BSc Zhejiang University, PhD Chinese Academy of Sciences (to 13/07/2023)
A. Marignier, MSci PhD University College London (from 23/01/2023)
R. McGirr, BSc (Hons) Sydney, PhD ANU
T. Merry, MSci Cambridge, PhD Imperial College London (from 16/01/2023)
L. Otter, BSc JGU, MSc joint JGU and MPIC, PhD Macquarie
R. Pickle, BS UC at Davis, MSc Brown, PhD Auckland
S.M. Razeghi, MSc Tehran, PhD Newcastle (to 05/04/2023)
W. Scott, MSci PhD Imperial College London (from 08/05/2023)
Z. Sudholz, BSc Monash, BSc (Hons) UWA, PhD ANU (to 01/09/2023)
S. Wang, BSc (Hons) Wuhan, MSc Univ Chinese Acad Sci, PhD ANU
Z. Wei, BSc CUMT (China University of Mining and Technology), PHD UCAS (University of Chinese Academy of Sciences) (from 10/02/2023)

Postdoctoral Fellows (continued)

H. Yang, Bachelor Jilin Univ, Master Copenhagan, PhD Melb (to 01/06/2023)
P. Zhang, BSc Jilin Univ, MSc Univ Sci&Tech China, PhD ANU

Emeritus Professors

R.J. Arculus, BSc PhD Durham, FAIMM
V. Bennett, BSc PhD UCLA
I.H. Campbell, BSc UWA, PhD DIC London
S.F. Cox, BSc UTas, PhD Monash
P. De Deckker, BA MSc (Hons) Macquarie, PhD DSc Adelaide
Stephen Eggins, BAppSc UNSW, PhD UTas
David Ellis, MSc Melbourne, PhD UTas
N.F. Exon, BSc (Hons) UNSW, PhD Kiel
R.W. Griffiths, BSc PhD ANU, FAIP, FAA
R. Grun, Diplo Geol, Dr.rer.nat.habil Köln, DSc ANU, FAAH
I.N.S. Jackson, BSc Qld, PhD ANU, FAA
B.L.N. Kennett, MA PhD ScD Cambridge, FAA, FRS
K. Lambeck, BSurv NSW, DPhil DSc Oxford, FAA, FRS
H. O'Neill, BA Oxford, PhD Manchester, FAA, FRS
B.J. Pillans, BSc PhD ANU, HonFRSNZ
M. Roderick, BAppSc QUT, PGDipGIS Qld, PhD Curtin
I.S. Williams, BSc PhD ANU

Honorary Professors

S. Foley, BSc (Hons) Southampton, MSc Memorial Univ Newfoundland, PhD Tasmania
C.B. Foster, BSc (Hons) Adelaide, PhD Qld
A. Gerson, PhD Strathclyde Scotland
T. Ireland, BSc Otago, PhD ANU (to 09/05/2023)
W. Maher, BAppSci (Hons) MAppSci Melbourne, PhD Southampton
E. Rohling, BSc MSc PhD Utrecht (from 02/10/2023)
N. Williams, BSc (Hons) ANU, MPhil PhD Yale
L. Wyborn, BSc (Hons) Sydney, Dip Ed UC, PhD ANU

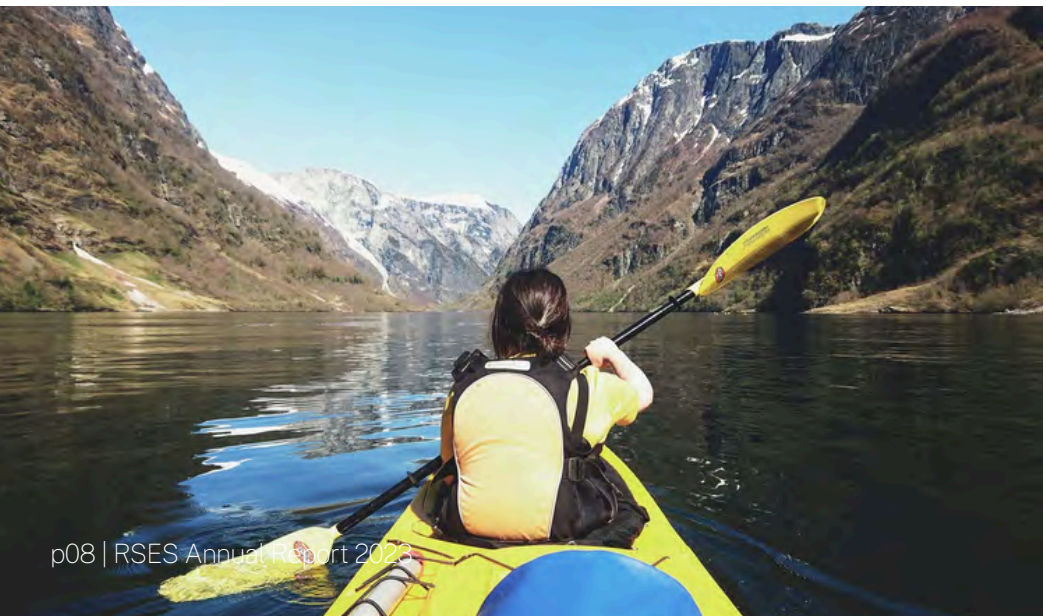
Honorary Associate Professors

Y. Amelin, MSc PhD Leningrad State
R.A. Armstrong, BSc MSc Natal, PhD Witwatersrand
R.V. Burne, BSc Wales, DPhil Oxford
T. Esat, BSc Univ College London, MSc Queens Univ Canada, PhD ANU (to 31/12/2023)
C.M. Fanning, BSc Adelaide
G.M. Gibson, BSc Edinburgh, PhD Otago
A. Jaques, BSc (Hons) WA, PhD Tasmania
S. McClusky, BSurv PhD UNSW
T. Mernagh, BSc (Hons) PhD Newcastle
B. Opdyke, AB Columbia, MS PhD Michigan
R. Skirrow, BSc WA, Postgrad Dip Sci (Hons) Newcastle, MSc Carleton Univ, PhD ANU

Staff List

Honorary	G. Marino, MSc (cum laude) 'Federico II' of Naples; PhD Utrecht
Senior	G. Shephard, BSc (Adv. Hons I), PhD Sydney (from 03/07/2023)
Lecturers	A. Valentine, BA MSc Cambridge, DPhil Oxford
Honorary	S. Allgeyer, PhD Paris Diderot, France
Lecturers	L. Bean, BSc Sydney, DipEd Syd Teachers College, Grad Dip, PhD ANU
	M.W. Forster, Diplom Geologist (MSc equiv) PhD Macquarie
	J. Nunes Avila, BSc MSc UFRGS, PhD ANU
	A. Rosenthal, MSc Tech Univ Bergakademie Freiberg, PhD ANU
Visiting	J. Foster, BSc Sydney, MSc PhD ANU
Fellows	T. Gruetzner-Handke, Diploma Geology (equiv Masters) Universitat Mainz, Dr.rer.Nat. Westfalische Wilhelms Universitat Munster
	D. Hutchinson, PhB (Hons) ANU, PhD UNSW (to 03/01/2023)
	K. Jones, BSc (Hons) ANU, PhD Bristol (to 31/08/2023)
	V. Kamenetsky, BSc (Hons), PhD Russian Academy of Sciences (from 13/03/2023 to 12/03/2024)
	C. Klootwijk, BSc MSc PhD Utrecht (to 31/12/2023)
	D. Mole, MSc Univ College London, PhD UWA
	P. O'Brien, BSc (Hons) PhD Melbourne
	M. Rigo, Master in Natural Sci cum Laude PhD Padova (to 03/01/2023)
	M. Valetich, BSc (Hons) PhD ANU (to 09/02/2023)
	K. Zhao, PhD ETH Zurich (from 01/12/2023)
	Z. Zhou, BSc Guilin Univ of Tech, MSc PhD Chinese Academy of Geological Sciences (to 30/12/2023)
	J. Zhou, PhD Jilin Univ (from 31/07/2023)

Credit: Polina Sholeninova (left) , Timothy Leong (right)





PROFESSIONAL STAFF

School Manager	G.F.M. Pearson, BA, BTh, MBA, FIML
Executive Assistant to the Director & the School Manager	T. Adams
Administration Manager	V. Riddle, Dip Leadership & Management AIM (to 04/08/2023) A. Norman, BSc (Hons) Trent (from 04/12/2023)
Building and Facilities Officer	E. Ward, Cert V Frontline Management, Quest/ANU
WHS Officer	N. Papparlado (to 20/02/2023) E. Mohamed, BSc, MSc, IUST, PhD ANU (from 03/07/2023)
Education Developer	H. McGregor, BSc Macquarie, GradDipEd (Science)
Senior HDR Administrator	R. Anderson, B.Bus (USC) (from 27/11/2023)
Student Administration Officier	K. Thow, BA Macquarie, MPolScADv ANU
Communications Officer	L. Medenis (to 08/07/2023)
Receptionist	G. Alvarez Rodriguez, BSc University of Texas, MPhil (to 01/12/2023) M. Bares, BA Louisiana, MFA University of Michigan (from 04/12/2023)
Research Group Administrators	J. Magro A. Daley, Cert IV Procurement & Contracts
IODP/ANZIC Program Manager	S. Kachovich, Bsc (Hons) UOW, PhD University of Queensland
IODP/ANZIC Administrator	K. Kenney
IODP/ANZIC Communications Officer	J. Kennard
Administrator for Centre of Excellence for Climate Extremes	C. Tucker
Collections Officer	C. Reppin (from 21/03/2023)

Laboratory Operations

Manager

A. Latimore, BEng University of Canberra

Technical Support

D. Clark, Cert III Metal Fabrication AdvDipEng CIT
R. Esmay, BSc (Sr Thesis) SUNY Purchase
P. Hu, PhD ANU & Chinese Academy of Sciences
P. Lanc, AssocDip Bus (Applied Computing) CIT
Y. Liu, BEng MEng ANU
H. Miller, AdDipMechEng CIT
Y. Qian, BEng Anhui Univ, MSc Beijing Normal Univ, PhD ANU
A. Rummery, Cert III CIT (x3)
H. Sasaki, AssocDip CIT

Geochemical Instrument Operations

Manager

B. Knowles, BSc PhD Wollongong

Technical Support

J. Cali (to 19/08/2023)
B. Chen (to 01/08//2023)
H. Chin, BA MArchSci ANU (from 27/11/2023)
B. Fang, BEng, Jilin University (JLU); Research MSc, University of Science and Technology of China (USTC) (from 10/05/2023)
M.W. Forster, PhD Macquarie University (Sydney) (from 06/11/2023)
B. Fu, BSc Chungchun, MSc Nanjing, PhD Vrije (to 14/06/2023)
R. Grun, BSc (Hons) ANU (to 27/07/2023)
J. Hope, BSc James Cook
X. Ji, BSc NUIST, MSc (Adv) ANU (to 12/12/2023)
L. Rodriguez Sanz, BSc Venezuela, MEnvStudies, PhD Autonomous (Barcelona)
D. Vasegh, AssocDeg Khajeh Nasireddin Toosi University of Technology (Iran) (to 25/02/2023)
Y. Wang, BSc and MSc Jilin University, PhD Chinese Academy of Geological Sciences
J. Wu, BSc and MSc USTC, PhD ANU (from 03/10/2023)
Y. Wu, BEng China Univ, MSc Univ Newfoundland, PhD ANU
W. Xiao, BEng (Hons) Hunan, PhD UNSW (to 04/08/2023)
S. Zink, BSc Hanover, Diploma (MSc) Hanover

Geophysical Data & Computation

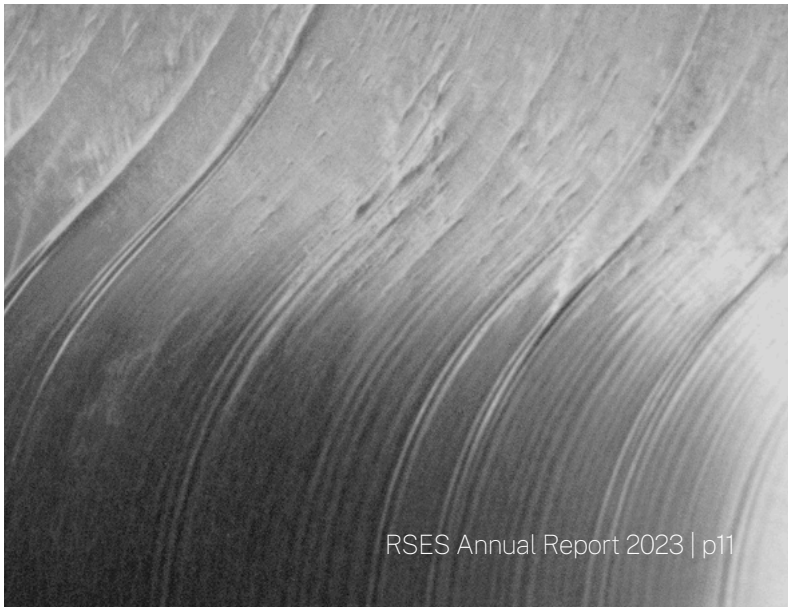
Manager	H.W.S. McQueen, BSc Qld, MSc York, PhD ANU
Scientific Programmers	J. Byrne, BSc (Hons) ANU, PhD Monash J. He, Bachelor of IT (Hons) ANU
Software Engineer	A. Gibson, BCompSci (Hons) PhD ANU M. Tourdot de Oliveira, BSc PhD Coimbra
Research Officers	J.C. Graciosa, BSc MSc University of San Carlos, PhD Monash (from 20/03/2023) K. Hayward, BCom Wollongong, MNHD MPhil PhD ANU S. Mousavi, BSc MSc, Tehran University, PhD Leipzig M. Salmon, BSc (Hons) PhD Victoria (Wellington)
Technical Support	K. Berends (from 21/08/2023) R. Erigela, BTech Jawaharlal Nehru Technological University, PGDip NIELIT-India, MScEng Swinburne P. Kaduru, Bach Electronics & Comm Eng Jawaharlal Tech, Masters in IT Charles Sturt (to 13/12/2023) R. Voore, B.Tech (CSE) LPU INDIA, MScDS (Master of Data Science) La Trobe Uni Melbourne (from 09/01/2023)

COG Support

Research Officers	L. Velasquez Jimenez, BSc Pontificia Universidad Javeriana, MSc PhD James Cook

Credit: Navid Constantinou (left), Jim Sweetman (right)





POSTGRADUATE STUDENTS

PhD Candidates

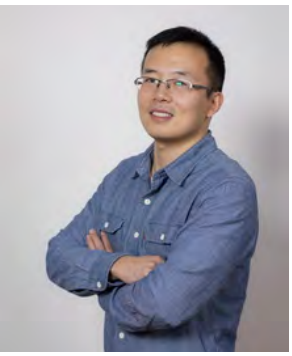
Adroli, Nurmalia Mauludin
Agrawal, Shubham
Ahnaf, Jemi Saputra
Amarathunga, Udara
Arcot Parthiban, Ramkumar
Baeza, Leonardo Ismael
Baile, Riley John
Barnes, Ashley
Bhagtani, Dhruv
Bilton, Leon Serwin
Bishop, Caleb
Bonning, Geoffrey
Cajal Contreras, Yamila
Carrasco Godoy, Carlos Ignacio
Chandler, Ross Berge
Chen, Fangqin
Cheng, Ming
Cheng, Yun-Ze
Costa de Lima, Thuany Patricia
De Freitas Rodrigues, Rodrigo Antonio
Devi, Riteshma
Di, Yankun
Dodd, Lachlan
Durgalakshmi
Duvernay, Thomas Alexis
Egbo, Miracle Oluebube
Eggins, Sam
Ellepola, Anupiya Vidarshana
Fang, Bowen
Goswami, Pranami
Gray, Sharon
Grun, Robin
Harazin, Kathleen
Hargreaves, Jessica
Hsu, Shao-Chen
Hu, Jinyin
Huang, Zhijie
Hussain, Jabir
Ingles, Christopher
Jackson, Sarah
Jayasoma, Kushani
Jeffree, Jemima
Ji, Xuan
Jiang, Shihao
Jones, Alysha May
Kinsley, Jordan Alexander
Kirby, Rachel Sarah
Kou, Yingxin
Krestianinov, Evgenii
Lawler, Kelly-Anne
Leong, Edgar
Leong, Kit Ieng
Leong, Timothy Sung Jue
Lewis, Hilary
Liang, Man
Liyanage, Tharika Mayomi
Loidolt, Christina
Lu, Neng
Maharaj, Prayna
Makushkina, Anna
Martin, Stacey Servito
McConachie, Shannon Clare
Medd, Oliver Merlin
Meng, Hangyu
Mina, Alana Andrea
Naina, Naina
Nakrong, Nipaporn
Nugraheni, Rosmalia Dita
Nugroho, Hendro
O'Brien, Helen Jane
Owens, Ryan John
Pandey, Abhay
Pasic, Bozana
Patkar, Aditya Dilip
Piedrahita Velez, Victor
Rama, Jemima
Ray, Srijita
Roosmawati, Nova
Sajeev, Sruthy
Sakti, Artadi Pria Sakti
Sanjayan Nair Bindhu, Ammu
Scheiter, Matthias Konrad Johannes
Sebastian, Nita
Sembatya, Naiga Erios
Sholeninova, Polina
Sombutsirinun, Phudit
Sun, Weipin
Sun, Yaojia
Sweetman, James
Turner, Ruby
Turunctur, Buse
Weber, Rikki
Wilsbacher, M Catherine
Wu, Jiade
Ye, Tao
Yeung, Ho Sonia
Yung, Claire
Zhang, Ping
Zhao, Siyuan
Zhao, Song
Zhu, Ziyi

MPhil Candidates

Alvarez Rodriguez, Guadalupe
Du, Haoran
Wu, Yunqi (Yoli)

STAFF HONOURS & AWARDS

STAFF MEMBER	AWARD	AWARDING BODY
Dr. Chengxin Jiang	Visiting Research Fellowship	Earthquake Research Institute, Tokyo
Dr. Sarah Kachovich, Dr. Chiara Holgate	Superstar of STEM	Science and Technology Australia
Em. Prof. Brian L. N. Kennett	Harry Fielding Reid Medal	Seismological Society of America
Prof. Penny King	2023 Geochemistry Fellow	Geochemical Society and European Association of Geochemistry
Prof. John Mavrogenes	Joe Harms Medal	Geological Society of Australia
Prof. Louis Moresi	Elected Fellow	Australian Academy of Science
Dr. Thanh-Son Phạm	Visiting Research Fellowship	Earthquake Research Institute, Tokyo
Dr. Callum Shakespeare	2024 Nicholas P. Fofonoff Award	American Meteorological Society
Prof. Hrvoje Tkalčić	Vice-Chancellor's Award for Excellence in Supervision 2023	Australian National University
Prof. Hrvoje Tkalčić	2023 Distinguished Scientist Award	Chinese Academy of Science
Dr. Sheng Wang	Fellow	ETH Zürich
Patrick De Decker	Medal for Excellence in Scientific Research	Royal Society of Victoria











THESES AND AWARDS

PhD theses completed (Supervisor in parentheses)

Shubham Agrawal, “Seismicity and structure of the eastern Gawler Craton and Lake Eyre region”. (Caroline Eakin).

Ahangama Vithanage Udara Amarathunga, “Mediterranean oceanography and North African climate over the Pliocene.“ (Katharine Grant)

Fangqin Chen, “Controls on the Dynamics of Subducting Slabs in a 3-D Spherical Shell Domain.“ (Rhodri Davies)

Yamila Cajal Contreras, “Magma evolution and fertility of the supergiant porphyry Cu deposits from Central Chile: insights from PGE and ziron geochemistry.” (Ian Campbell)

Riteshma Devi, “Using Silicon Isotopes to Trace the Biogenic Silica in the Southern Ocean.“ (Michael Ellwood)

Yankun Di, “The initial 87Sr/86Sr of the Solar System.“ (Yuri Amelin)

Durgalakshmi, “The enigmatic Archaean-Proterozoic transition: an exposed crustal cross-section in the Southern Granulite Terrane, Tamil Nadu, India.” (Ian Williams)

Thomas Duvernay, “Unravelling the Dynamical Mechanisms Underpinning Intra-Plate Volcanism Within and Around Earth's Continents.” (Rhodri Davies)

Jessica Hargreaves, “A Christmas Coral; Past and Present Variability of Tropical Hydroclimate”. (Nerilie Abram)

Sarah Jackson, “Climate variability in coastal East Antarctica over the past millennia: insights from the Mount Brown South ice core water isotope record.“ (Nerilie Abram)

Yingxin Kou, “Evolution of the tropical Indian ocean and Indian summer monsoon through the Mid-Pleistocene Transition” (Eelco Rohling)

Prayna Maharaj, “Copper-Phytoplankton reciprocal interaction: Biogeochemical cycling of copper and its isotopes.“ (Michael Ellwood)

Victor Piedrahita, “Triggering Mechanisms and Carbon Sequestration Timescales of Late Paleocene-Early Eocene Carbon Cycle Perturbations.” (Andrew Roberts, Eelco Rohling, David Heslop, and Katharine Grant)

Ping Zhang, “Understanding Arc-Continent Collision in the Banda Arc Through 3-D Seismic Imaging.” (Meghan Miller)

Ziyi Zhu, “Unravelling the evolution of continents using detrital zircons from modern rivers.” (Ian Campbell)

MPhil thesis completed (Supervisor in parentheses)

Haoran Du, “Investigations of seismic anisotropy beneath the Macquarie Ridge Complex” (Caroline Eakin

Master of Earth Sciences (Advanced) (Supervisor in parentheses)

Jemi Ahnaf, “Geochemistry of the Mammoth and Esperanza Sediment-Hosted Copper Deposits in the Mt. Isa Western Succession, Australia.” (John Mavrogenes)

Dzaky Irfansyah, “Basin resonance investigation through 2D numerical simulation of ground motions in Jakarta Basin.” (Phil Cummins)

Xuehan Kang, “An experimental investigation of mixing effect on energy balance of evaporating water surface.” (Callum Shakespeare)

Zhihan Liu “Catalogue various signals from ambient noise with ocean-bottom seismometer data.” (Hrvoje Tkalčić and Xialong Ma)

Caleb McCollum, “Pretreatment of Basalt to Facilitate Carbonation and Its Implications.” (Penny King)

Rakshith Ravichander, “Tracking Groundwater Level Variations In The Lachlan Catchment Using Ambient Noise Interferometry.” (Chengxin Jiang and Louis Moresi)

Jiarun Zhou, “Developing a deep-learning model to detect and measure the Earth’s inner-core sensitive waves.” (Hrvoje Tkalčić and Thanh-Son Pham)

Honours completed

Carolina Engel Spital, “Petrological and geochemical analysis of the newly discovered carbonatite intrusion in the Gifford Creek Carbonatite Complex, Western Australia.“ (John Mavrogenes)

Marissa Higgins, “The geology, geochemistry and petrology of the Yin Rare Earth Element carbonatite-ironstone dyke complex, Western Australia.” (John Mavrogenes)

Ashley Huang, “Role of Sea Surface Temperature and Sea Level Pressure on Australian Rainfall Variability.“ (Nerilie Abram)

Koh Kawaguchi, “"A New Method Of Estimating Incoming Longwave Radiation And Application to a High Carbon Future Scenario.“ (Callum Shakespeare and Michael Roderick)

Jaxon Kneipp, “Towards improved software visualisation of parametrised REE patterns: Introducing REEkit for geological analysis” (Michael Anenburg)

Darby Liersch, “The case for brine-melt driven REE mineralisation in carbonatites“ (Michael Anenburg)

Xulu Lin, "Imaging the upper lithospheric structures of Northern Zealandia using ambient noise cross-correlation" (Meghan Miller and Chengxin Jiang)

Hannah Loiterton, “Calcium Oxalate Coatings and the Search for Life on Mars.“ (Penny King)

Fiona Nguyen, “Erebus Megacrysts: An Insight into Gas-Solid Reactions.” (Penny King)

Rishika Prabhakaran, “Diversity, Equity & Inclusivity in Australian astronomy outreach.“ (Brad Tucker (Astro))

Emily Robson, “Pretreatment of Basalt to Facilitate Carbonation and its Implications.“ (Penny King)

Samantha Williams, “Developing a High-Resolution Water Temperature Proxy via Identification of Daily Growth Increments and Stable Oxygen Isotopes (δ18O) in giant clam (Tridacna spp.) shells.“ (Stewart Fallon)

STUDENT HONOURS & AWARDS

Higher Degree Research	
Australian Earthquake Engineering Society (AEES) Best Student Paper and Presentation Award, 2023	Stacey Martin
DA Brown Travel Fellowship	Carlos Carrasco Godoy
Mervyn & Katalin Paterson Fellowship	Siyuan Zhao Stacey Martin Ho Sonia Yeung Nipaporn Nakrong
Seismological Society of America Travel Grant, 2023	Stacey Martin
Outstanding Student Presentation Award (OSPA), American Geophysical Union (AGU)	Dr. Sheng Wang
AGU's Study of the Earth's Deep Interior SEDI Graduate Research Award	Dr. Sheng Wang
Robert Hill Memorial Prize	Dr. Sheng Wang
Sue Kesson Travel Award	Christina Loidolt Catherine Wilsbacher
Best Student Poster Award for his poster about the 2018 Lombok earthquake sequence study, 20th Annual Meeting of the Asia Oceania Geosciences Society (AOGS 2023) in Singapore	Dr. Siyuan Zhao
AGU 2023 Harry Elderfield Award	Udara Amarathunga
China Scholarship Council's Chinese Government Award for Outstanding Self-financed Students Abroad	Dr. Ping Zhang

Undergraduate (2023 Nominees)	
Ken Campbell First Year Prize	Flora Munro
Edward Irving Prize for Geophysics	Alex Vickery
W B Clarke Second Year Prize in Earth Sciences	Chung Hei Jonas Lai
Irene Crespin Prize for Palaeontology	Rosalita Rosenberg
GSA Mike Rickard Third Year Prize	Bae Beezley
Graduate Women NSW (Canberra) Prize in Climate Science	Rosalita Rosenberg and Imogen Bailey
ANU University Medal	Darby Liersch

UNDERGRADUATE & POSTGRADUATE COURSES

Earth & Marine Science Programme			
Course Code	Course Description	Convenor, Teaching staff	Number of students
EMSC1006/6107	Blue Planet	M.Ellwood, N. Abram, E. Rohling, G. Falster	136
EMSC2022/6122	Introduction to Global Geophysics	M. Miller, D. Heslop, V. Hui Lai, L. Moresi	29
EMSC2023	Fundamentals of Geology	G. Yaxley, A. Roberts	30
EMSC3020/6019	Geobiology & Evolution of Life on Earth	J. Brocks, S. Kealy, S. Haberle	36
EMSC3023/6023	Marine Biogeochemistry	M. Ellwood	28
EMSC3024/6024	Magmatism & Metamorphism	A. Berry, A. Burnham, G. Yaxley	13
EMSC3032/6032	Melting Polar Ice Sheets	P. Tregoning	20
EMSC4017/8017	Research Methods and Proposal	A. Roberts	7
EMSC4033/8033	Computational Geosciences: Problem-solving, Logical Thinking and Programming	L. Moresi, N. Constantinou	5
EMSC4122/8022	Analytical Techniques	S. Fallon	9
EMSC4706/8706	Natural Hazards	P. Cummins	10

Earth & Marine Science Programme

Course Code	Course Description	Convenor, Teaching staff	Number of students
Winter			
EMSC3019/6119	Coral Reef Field Studies	S.Fallon, M. Ellwood, G. Falster	25
Semester 2			
EMSC1008/6008	Earth	A. Berry, C. Eakin	75
EMSC2021/6021	Climate System Science	C. Shakespeare A. Morrison W. Huneke	57
EMSC2024/6124	Geochemical Cycles	J. Brocks, M. Anenburg, D. Jacob, P. King	15
EMSC3002/6030	Structural Geology & Tectonics	L. Moresi, C. Jiang	11
EMSC3007/6007	Economic Geology	J. Mavrogenes	17
EMSC3022/6022	Planetary Science	P. King, O. Alard	41
EMSC3025/6025	Groundwater	P. Tregoning	13
EMSC4017/8017	Research Methods and Proposal	H. Tkalčić	7
EMSC3034/6034	Dynamic Earth	R. Davies	11
EMSC4123/8023	Data Analysis	M. Sambridge	3
EMSC8032	Research Proposal & Presentation	D. Heslop	1

Earth & Marine Science Programme

Course Code	Course description	Convenor, teaching staff	Number of students
New Colombo Plan			
EMSC3050/8014	NCP Field trip (Japan)	D. Heslop, W. Grant (CPAS), D. Gürer (UQ)	16
All Year			
EMSC3050/8014	Research project (6 units)	EMSC3050 (sem. 1) EMSC8014 (sem. 2)	11 4

Physics Programme (Research School of Physics & Engineering)

Course Code	Course description	Convenor, teaching staff	Number of students
PHYS2201	Classical Mechanics	C. Shakespeare	73
PHYS3070	Physics of the Earth	H.Tkalčić, L. Moresi	14

Biological Anthropology Programme (Research School of Humanities & the Arts, School of Archaeology and Anthropology)

ARCH3042/6510	Scientific Dating in Archaeology & Palaeoenvironmental Studies	R. Wood, K. Grant, D. Heslop	25

Environmental Science Programme (Fenner School of Environment & Society)

ENVS3013	Climate Change: Past, Present and Future	J. Gergis (Fenner), N. Abram	63

AUSTRALIAN & NEW ZEALAND INTERNATIONAL OCEAN DISCOVERY PROGRAM CONSORTIUM (ANZIC)

Group leader	Dr. Ron Hackney
Program Manager	Dr. Sarah Kachovich
Members	Kelly Kenney Jenifer Waters (to 18/03/2023) Janelle Kennard (from 31/07/2023)

ANZIC is the Australian & New Zealand International Ocean Discovery Program (IODP) Consortium, part of an international marine research collaboration harnessing state-of-the-art scientific ocean drilling infrastructure to explore the Earth under the sea. The Research School of Earth Sciences has hosted the ANZIC office for more than a decade.

The biggest news for ANZIC in 2023 was the announcement in October of almost $10 million in new funding, through AuScope, under the National Collaborative Research Infrastructure Strategy (NCRIS). This gives ANZIC funding certainty from 2025 through to mid-2027, allowing the continuation of Australia's participation in international scientific ocean drilling programs. The funding also allows Australia to join the International Continental Scientific Drilling Program.

In 2023, ANZIC facilitated the participation of five researchers in IODP expeditions:

- Acacia Clarke (University of Tasmania) – IODP Expedition 398: Hellenic Arc Volcanic Field
- Prof. Gordon Southam (University of Queensland) - IODP Expedition 399: Building Blocks of Life, Atlantis Massif
- Dr. Katharina Hochmuth (University of Tasmania) - IODP Expedition 395: Reykjanes Mantle Convection and Climate
- Dr. Georgia Grant (GNS Science, New Zealand) - IODP Expedition 400: Northwest Greenland Glaciated Margin
- Prof. Jody Webster (University of Sydney) - IODP Expedition 389: Hawaiian Drowned Reefs

We provided significant funding for post-cruise research to six further expeditioners - including Prof. Jimin Yu (IODP Expedition 397) and Dr. Derya Güerer (IODP Expedition 392) from the ANU - through our $40k Post Cruise Analytical Funding (PCAF) scheme.

Twenty projects benefited from over $350,000 in ANZIC IODP Legacy Analytical Funding (AILAF) in 2023, including one from the ANU. These grants support scientists across a range of fields to undertake analytical research using the vast library of cores, samples and data collected during 55 years of scientific ocean drilling.

ANZIC (continued)

In April ANZIC conducted the Future DEEP (Drilling to Explore Earth's Past) Workshop. This provided an important channel for the development of innovative scientific drilling proposals, designed to inform diverse scientific questions in the oceans and on land. Read the detailed report (https://iodp.org.au/engage/) covering innovative drilling ideas across seven science priorities identified by over 130 participants from 14 countries.

We continued our commitment to connecting researchers, especially Early Career Researchers and students, to international training opportunities, selecting and sponsoring seven students to attend IODP Summer Schools in the United Kingdom and Germany.



ANZIC Director, Ron Hackney, past ANZIC Director Prof. Neville Exon, and Prof. Richard Arculus at the RSES 50th.



Myra Keep (UWA/ANZIC), Sarah Kachovich (ANU/ANZIC), Rebecca Farrington (AuScope) and Sima Mousavi (ANU/AuScope) exemplify the new AuScope/ANZIC NCRIS partnership in front of a joint booth at the Australian Earth Science Convention (June 2023).

ANZIC (continued)

Staff News

ANZIC's Communications Officer, Jenifer Waters, moved interstate in March after creating a huge lift in our communications and a wonderful new website (https://iodp.org.au). In August, her shoes were filled by Janelle Kennard, who brings a depth of experience across a range of communications channels and with member-based organisations.

Student News

Rebecca Hodgson, Undergraduate student from the Australian National Centre for the Public Awareness of Science, joined us as an intern for 4 months in late 2023. Rebecca is being supervised by Dr. Sarah Kachovich to create a graphic novel illustrating the discoveries made in climate, sea level change and biodiversity during three IODP expeditions that have drilled coral reefs.

Emeritus, Honorary Staff and Visitors

During 2023, ANZIC hosted several short-term visitors to discuss future scientific drilling opportunities:

- Dr. Marguerite Godard (Université de Montpellier, France)
- Prof. Mike Coffin (University of Tasmania and past ANZIC Science Committee Chair)
- Dr. Ai Li and Dr. John Dodson (Institute of Earth and Environment, China Academy of Sciences)

Extended Travel and Outcomes

Dr. Sarah Kachovich:

- SCAR INSTANT Conference in Italy (September) where she presented the Future DEEP Workshop Report and connected ANZIC community research with the Northern Hemisphere. She then stayed on at the European IODP office (ECORD) in Italy and Scotland for two weeks to learn and exchange program level-procedures.
- AGU (US, December) on an RSES staff development award, to pursue science diplomacy and further build international collaborations to navigate changes to IODP.

Dr. Ron Hackney:

- 25th Anniversary Conference of the International Continental Scientific Drilling Program, Germany (July), to kick-start Australia's membership in this 27-year global collaboration.

Outreach Activities & Service Roles External to ANU

ANZIC maintained a high level of engagement with our wide-reaching member community through:

- an Australian ANZIC Roadshow in February/March showcasing IODP science and opportunities across 11 Australian universities
- hosting the annual IODP Forum in October, a key event for exchanging ideas and views on the scientific progress of IODP and for providing advice to the IODP Facility Boards on Platform Provider activity
- outreach activities during the year, including participating in National Science Week, Earth and Environmental Science Olympiad and the ANU Research Infrastructure Expo
- keeping researchers at member institutions, including the ANU, up to date with upcoming opportunities in IODP through our monthly ANZIC email Bulletin (https://us17.campaign-archive.com/home/?u=9cf3109dfd45d5d26c57f2add&id=9deca7d97b)

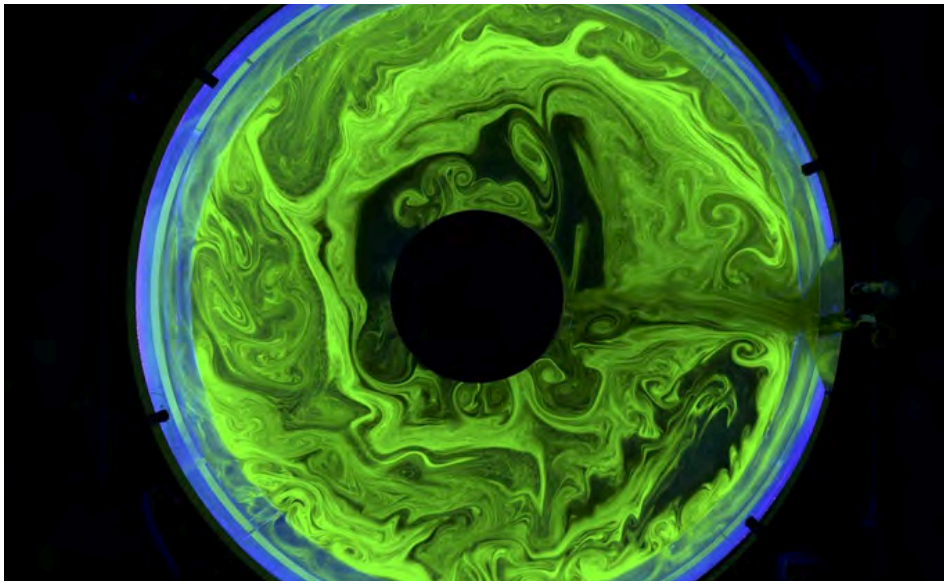
CLIMATE & OCEAN GEOSCIENCE

Group leader Prof. Paul Tregoning

Academic members Prof. Nerilie Abram, Dr. Sebastien Allgeyer, Dr. Navid Constantinou, Prof. Michael Ellwood, Prof. Stewart Fallon, Dr. Katharine Grant, , Dr. David Heslop, Dr. Wilma Huneke, Dr. Laura Jimenez, Dr. Andrew Kiss, Dr. Simon McClusky, Dr. Herb McQueen, Dr. Nicola Maher, Dr. Adele Morrison, Dr. Bradley Opdyke, Dr. Anthony Purcell, Dr. Mahdiyeh Razeghi, Prof. Andrew P Roberts, Prof. Eelco Rohling, Dr. Callum Shakespeare, Dr. Kial Stewart, Prof. Jimin Yu, Emeritus Prof. Stephen Eggins, Emeritus Prof. Ross Griffiths, Emeritus Prof. Brad Pillans

Overview

Research in several diverse areas of Climate and Ocean Geoscience (COG) continued during 2023, encompassing work quantifying links between Antarctic glacier melt and slowdown of ocean circulation patterns, a successful ice coring field program and Antarctic mass balance change studies, as well as numerical ocean modelling, carbon sequestration and climate teleconnections. Several papers were published in high-impact journals and several COG members were awarded prestigious prizes. Prof. Andy Hogg was elected Fellow of the Australian Meteorological and Oceanographic Society, Dr. Sarah Jackson was awarded the Mertz Fellowship and Dr. Georgy Falster was awarded the best early career research from the Centre of Excellence for Climate Extremes for her work published in Nature. Many new appointments were made, including Dr. Adele Morrison to a continuing appointment, Dr. Sia Ghelichkhan to a tenure-track appointment and 5 fixed-term appointments (Drs Chris Gouramanis, Nicola Maher, Luwei Yang, Elizabeth Ellison, Yao Qian). Dr. Callum Shakespeare joins the continuing staff at RSES having successfully passed his tenure-track process. Over $1.5M new funding was raised during 2023 through external schemes (1 x ARC DECRA, 2 x ARC Discovery Projects, 1 x Australian Government contract) to provide support for research conducted in COG.

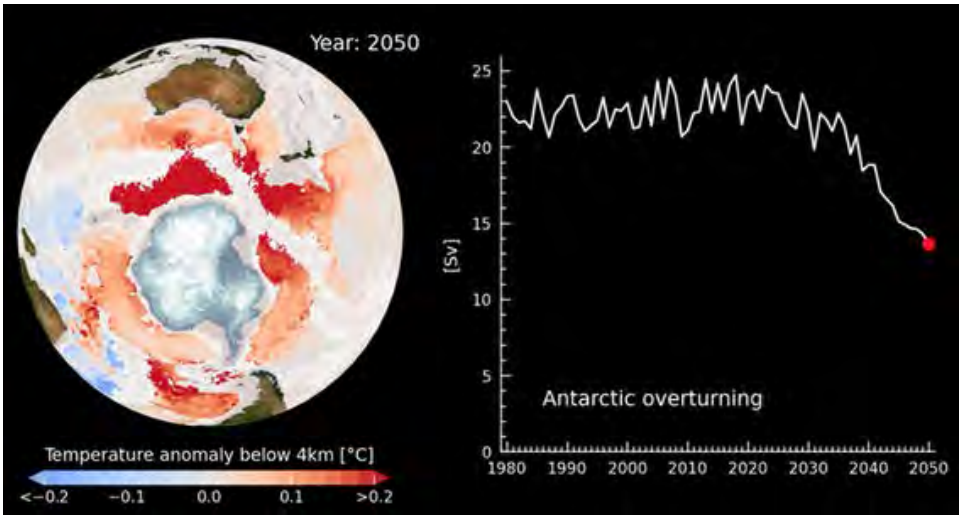


Glowing eddies in the Climate and Fluid Physics Laboratory. This image won the 2023 College of Science photo competition.

Climate & Ocean Geoscience Cont.

Research Highlights

The Climate and Fluid Physics group had another successful year in 2023. The group published a Nature article demonstrating how increased melting of Antarctic glaciers will lead to a significant slowdown of the deep ocean circulation through reduced deep water formation, with century timescale implications for the ability of the ocean to sequester heat and carbon. In related research, Wilma Huneke led a paper in Geophysical Research Letters showing how Antarctic Slope Current (which encircles the Antarctic continent) becomes bottom intensified in regions of deep water formation. PhD student Dhruv Bhagtani led a paper in the Journal of Physical Oceanography which used a high-resolution numerical ocean model to demonstrate the key role of surface heat fluxes in driving the gyres which fill the ocean basins; as such, this work challenges the traditional paradigm that gyres are forced exclusively by surface winds. The group also published a key paper this year in Atmospheric Measurement Techniques describing our new Wind Tunnel Facility in the Climate and Fluid Physics Laboratory. This facility has been many years in the making, but now provides the ability to perform precision measurements of the evaporative response of a water surface to enhanced radiative forcing. The apparatus will be used to evaluate and improve formulas for evaporation used in weather and climate prediction models.



The slowdown in the Antarctic overturning under climate change (Li, Morrison et al., 2023)

In 2023, the Paleomagnetism group published on a diverse range of research areas. This included publications in Nature Communications and Communications Earth & Environment and papers on topics such as, carbon sequestration, ocean bottom water oxygenation, climate teleconnections, and statistical inference. Ph.D. student Victor Piedrahita published the paper “Accelerated light carbon sequestration following late Paleocene-early Eocene carbon cycle perturbations” in Earth and Planetary Science Letters. Victor showed that rates of natural carbon sequestration depend on the amount of carbon released into the atmosphere. This finding has important implications for understanding how the oceanic biological pump may respond to anthropogenic carbon emissions. In January, a joint team from the Palaeomagnetism group and the University of Melbourne successfully recovered several sediment cores from Maar lakes in Western Victoria as part of ARC Discovery Project “Understanding the Geodynamo: Putting Australia on the Map”.

Research into past and future climates in 2023, under the leadership of Nerilie Abram, was supported by the Centre of Excellence for Climate Extremes, the Australian Centre for Excellence in Antarctic Science and a Discovery Project. A highlight was Dr. Georgy Falster’s Nature publication on "Forced changes in the Pacific Walker circulation over the past millennium". Dr. Chiara Holgate's research identified the synoptic pattern that brings drought breaking rainfall to southeast Australia and showed that human-caused climate warming is reducing the chances of drought breaking rains in our region. Her research was published in a special issue of Weather and Climate Extremes on the Tinderbox Drought that is being led by the Drought Program of the Centre of Excellence for Climate Extremes. A long-standing collaboration with researchers at ANSTO produced work that was published in Communications Earth and Environment demonstrating a recent decrease in rainfall recharge of southwest Australian groundwater that is unprecedented over at least the last 800 years.

Climate & Ocean Geoscience Cont.

Our group has helped to lead the PAGES2k CoralHydro2k research initiative, and in 2023 we published an open access database of coral δ18O and Sr/Ca records that will facilitate our research goals of reconstructing past tropical climates. Our group's contributions of the PAGES2k Iso2k working group also led to a publication in Nature Geoscience describing the globally coherent water cycle response to temperature change during the last two millennia. Our group research highlights also included contributions to Antarctic research, including multiple submitted and published papers on the Mount Brown South ice core, including Dr. Sarah Jackson's publication in Climate of the Past that identifies the importance of extreme precipitation events in the water isotope record at this site. A large effort in 2023 also went towards preparing for the 2023/24 Denman Terrestrial Campaign. Nerilie Abram led the ice drilling part of this major interdisciplinary science campaign from November 2023 to February 2024, which successfully saw the first Australian deployment of a rapid access ice drill. The success of this field program was made possible thanks to skilled technical support within RSES, including design and construction of an ice chip sampling tube by Hayden Miller and Dr. Laura Velasquez Jimenez.

Rapid Access Ice Drilling in Antarctica led by Prof. Nerilie Abram for ACEAS as part of the 2023/24 Denman Terrestrial Campaign.



The Radiocarbon Laboratory led by Stewart Fallon continued to collaborate with the Australian Federal Police National DNA Program for Unidentified and Missing Persons group. Utilizing radiocarbon to date unidentified material, we were able to confirm that >16 were older than 100 years. We determined that several would then be suitable for DNA analysis. The group continued its research on local CO2 accounting using radiocarbon to trace fossil fuel emissions. PhD students Bowen Fang and Tao Ye continued to explore coral and giant clam records for past climate. PhD student Oliver Medd is working on examining environmental links to tree death in the Snowy Mountains.

The Geodesy Group continued with the analysis of space gravity data and used it to quantify spatial patterns of changes in global ocean mass and mass balance in Antarctica. Dr. Rebecca McGirr presented results at the SCAR Instant conference in Italy as well as at the GRACE Follow-On Science Team meeting and AGU Fall Meeting. Software has been developed for assessing the utility of quantum gravity gradient instrumentation for use in low-Earth orbiting satellites and is ready for use in simulations to determine optimal orbit constellations (altitude, inclination of orbits, how many satellites) and required accuracy of the quantum instruments themselves. Rebecca McGirr's study on the achievable accuracy of mass change estimates under different GRACE instrument performance and satellite altitude was published in Journal of Geophysical Research. Version 2 of the ANU temporal gravity fields, derived from GRACE and GRACE-FO Level-1B data, is completed and will be released through the AuScope portal in 2024. Dr. Sia Ghelichkhan joined the Geodesy Group on a tenure-track appointment as part of the Institute for Water Futures. Sia will lead the development of new capability in modelling of water resources, including groundwater changes, across the Australian continent.

Climate & Ocean Geoscience Cont.

Labs and Facilities News

The Geophysical Fluid Dynamics Laboratory was officially renamed as the Climate and Fluid Physics Laboratory to better reflect current research activities which focus on key climate system processes (e.g., sea ice formation and melting, ocean evaporation, radiative transfer, glacial melt rates). Find out more about the newly badged CFP Lab at our website: www.cfplab.org

The Palaeomagnetism group relocated their Quantum Design - Magnetic Properties Measurement System instrument from the Black Mountain laboratory to Jaeger 4.

Staff News

- Dr. Callum Shakespeare was awarded the Nicholas P. Fofonoff Award 2024
- Prof. Andy Hogg was elected Fellow of AMOS
- Andrew Roberts was a Plenary Speaker at the Australian Earth Sciences Convention in Perth.
- Dr. Sarah Jackson was awarded the Mertz Fellowship. This will support collaborations between RSES and the University of Bern in the analysis of ice samples collected during the 2023/24 Denman Terrestrial Campaign in East Antarctica.
- Dr. Georgy Falster was awarded the best early career research from the Centre of Excellence for Climate Extremes for her work published in Nature.
- Dr. Chiara Holgate and Dr. Sarah Kachovich were selected into the 2023-24 Superstars of STEM program and participated in a range of career development events through this program.

New Appointments

- Dr. Adele Morrison: continuing appointment
- Dr. Sia Ghelichkhan: Institute for Water Futures tenure-track appointment
- Dr. Chris Gouramanis: 2-year fixed-term appointment
- Dr. Nicola Maher: 5-year fixed-term appointment
- Dr. Luwei Yang commenced a 3-year postdoc working on ocean tide modelling.
- Dr. Elizabeth Ellison commenced a 1-year postdoc working on ocean biogeochemistry in ACCESS models.
- Dr. Yao Qian was appointed as a Research Assistant in the Palaeomagnetism group as part of ARC Discovery Project “Understanding the Geodynamo: Putting Australia on the Map”.
- Dr. Andrew Roberts became CI Lead of the Australian & New Zealand IODP Consortium (ANZIC).
- Dr. Callum Shakespeare was successful in gaining tenure at RSES

Grants

- Navid Constantinou, Nicola Maher, Andy Hogg, ARC Discovery ($489,000)
- Paul Tregoning, Rebecca McGirr et al, ARC Discovery ($510,490)
- Rebecca McGirr, AuScope project ($50,000): “Analysis of GRACE-FO Level-1B data”
- Nicola Maher, DECRA ($450,042)

Student News

Several new PhD students commenced in COG during 2023:

- Lachlan Dodd (supervised by Paul Tregoning): “incorporation of SWOT satellite data into inversions of space gravity data to improve spatial resolution of continental water quantity estimates”
- Jemma Jeffree (supervised by Nicola Maher): “Insights into ENSO dynamics and predictability sources using large ensemble and analogue techniques”

Climate & Ocean Geoscience Cont.

PhD Completions

- Victor Piedrahita (supervised by Andrew Roberts with co-supervision by Eelco Rohling, David Heslop, and Katharine Grant) completed his PhD titled "Triggering Mechanisms and Carbon Sequestration Timescales of Late Paleocene-Early Eocene Carbon Cycle Perturbations". Published in Earth and Planetary Science Letters, Victor showed that rates of natural carbon sequestration depend on the amount of carbon released into the atmosphere. This finding has important implications for understanding how the oceanic biological pump may respond to anthropogenic carbon emissions.
- Jessica Hargreaves (supervised by Nerilie Abram) was awarded her PhD for research into "A Christmas Coral: Past and present variability of hydroclimate at Christmas Island". Jess is now working in a postdoctoral position at the University of Bremen.
- Sarah Jackson (supervised by Nerilie Abram) was awarded her PhD for her research investigating "Climate variability in coastal East Antarctica over the past millennia: insights from the Mount Brown South ice core water isotope record". Sarah is now working in a postodctoral position at the University of Bern.

Master of Philosophy Completions

- Xuehan Kang (supervised by Callum Shakespeare) completed her Masters in the Climate and Fluid Physics Laboratory, focusing on evaluating the evaporation rates of water surfaces exposed to longwave radiation.

Honours Completions

- Koh Kawaguchi (supervised by Callum Shakespeare) completed his Honours on developing a theoretical model for incoming longwave radiation at the Earth's surface.
- Samantha Williams (supervised by Stewart Fallon) completed Honours developing a high-resolution water temperature proxy in the giant clam (Tridacna spp.).

Emeritus, Honorary Staff and Visitors

Professor Cathy Constable from Scripps Institution of Oceanography visited the Palaeomagnetism group as part of ARC Discovery Project "Understanding the Geodynamo: Putting Australia on the Map".

Professor Steve Constable from Scripps Institution of Oceanography visited the Palaeomagnetism group and gave an RSES school seminar.

Syaiful Alam and Jayen Kriswantoro from Indonesia participated in the Future Research Talent scholarship program and undertook 12-week research projects with the Palaeomagnetism group.

Joonas Wasilijeff from the Geological Survey of Finland visited the Palaeomagnetism group as part of an ongoing collaboration investigating marine iron manganese nodules.



Neogene and Quaternary Planktonic Foraminifera Working Group presentations:

Lamyman, G. S., Fordham, B. G. (presenter, online), Pearson, P. N., Wade, B. S., Woodhouse, A. D., Young, J. R., & Aze, T. "Tree 2" of Aze & others (2011): TimeScale Creator tree generated from relational database, stratigraphic ranges linked (or not) to datums, eco- & morpho-groups, lineage–morphospecies integration, thumbnail images, pop-ups of info, links to WoRMS & mikrotax, nexus translation, phylogenetic listing. Neogene and Quaternary Planktonic Foraminifera Working Group meeting (IUGS International Commission on Stratigraphy, Subcommission on Neogene Stratigraphy), Smithsonian National Museum of Natural History, Washington D.C., 7 November 2023.

Aze, T. (Chair). Neogene and Quaternary Planktonic Foraminifera Working Group meeting (IUGS International Commission on Stratigraphy, Subcommission on Neogene Stratigraphy), International Symposium on Foraminifera (FORAMS 2023), Perugia, 25 June 2023.

Huber, B. T. & Petrizzo, M. R. (Chairs). Cretaceous Planktonic Foraminifera Working Group meeting (IUGS International Commission on Stratigraphy, Subcommission on Neogene Stratigraphy), International Symposium on Foraminifera (FORAMS 2023), Perugia, 25 June 2023.

Neogene and Quaternary Planktonic Foraminifera Working Group

The datasets and visualisation packages for our first-ever species-level phylogeny of all Cenozoic planktonic foraminifera ("Tree 2") are now being shared with more colleagues, and presentations were given at Perugia in June and Washington DC in November (the latter online for Dr. Patrick De Deckker). The lead author, Grace Lamyman, submitted this as part of her PhD (University of Leeds), accepted 2023.

For the quadrennial FORAMS conference at Perugia in June, Dr. Patrick De Deckker also presented a new angle on an old - but the only - phylogeny of foraminifera families. This tree, by two great foraminiferologists, Helen Tappan and Alfred Loeblich, appeared to attract some curious interest from today's high-tech molecular researchers, and from the larger plenary audience as it was the final paper given prior to the closing ceremony. Dr. Patrick De Deckker hopes to write up this paper in 2024.

Emeritus, Honorary Staff and Visitors

Dr. Patrick De Deckker researched the RV Belgica‘s research achievements of 1897-1899, writing several papers on the chemistry Antarctic lakes near Casey, deep-sea response to interglacial-glacial variability on the South Australian margin based on microfossils, evidence for accelerating mafic weathering in Southeast Asia during late Neogene cooling, and submarine canyons and slides in the central-west Otway Basin.

Extended Travel and Outcomes

Dr. Patrick De Deckker traveled to the University of Angers in France, the University of Cluj in Romania, Frederick Cook Foundation near Newark, USA and the University of Oregon, Eugene, USA to present research talks.

Outreach activities & Service roles external to ANU

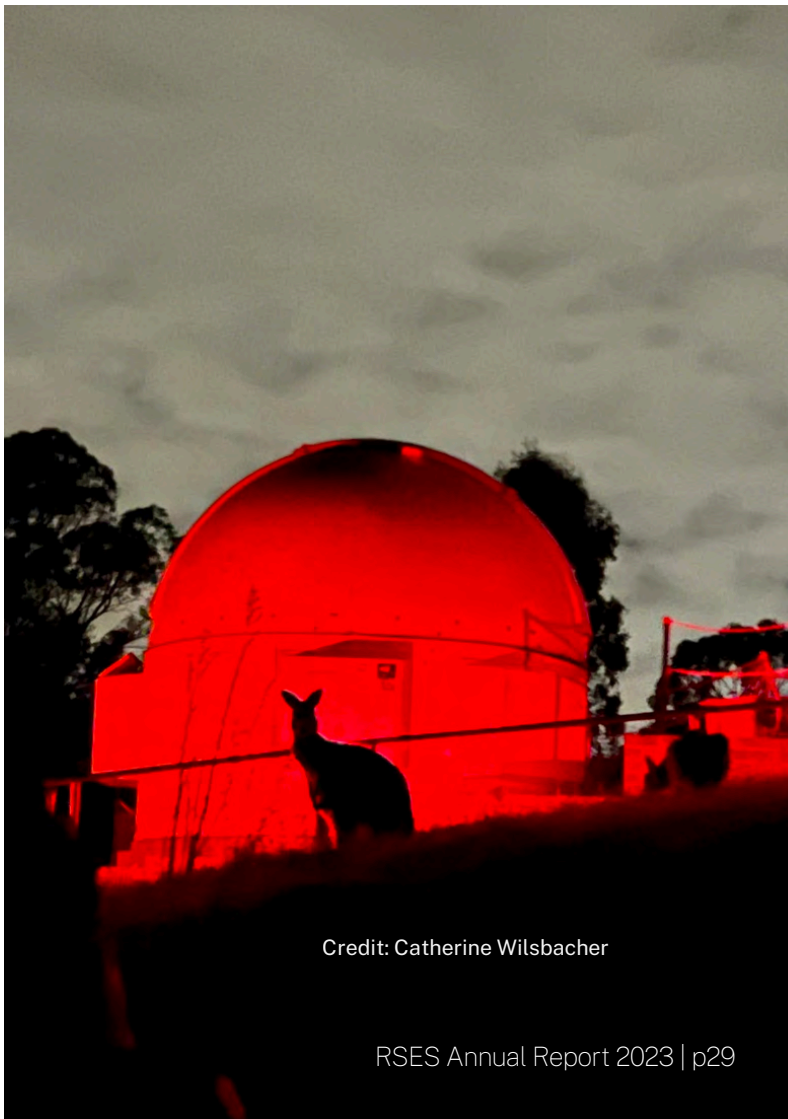
Dr. Patrick De Deckker participated in the following roles: Australian Academy of Science SC4 selection committee, Emeritus Faculty Committee, Friends of the Australian National Botanic Garden talks committee, Asia Oceania Geosciences Society Award Committe



Credit: Hangyu Meng



Credit: Georgy Falster



Credit: Catherine Wilsbacher

GEOCHEMISTRY

Group leader Prof. Greg Yaxley

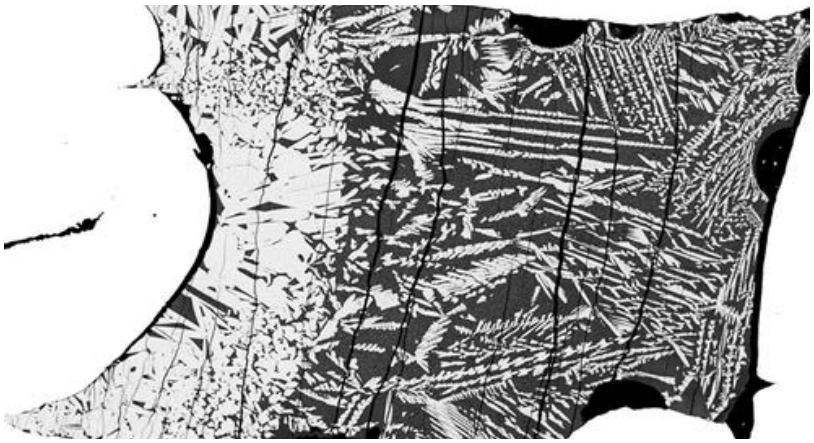
Academic Members Assoc. Prof. Yuri Amelin, Dr. Michael Anenburg, Emeritus Prof. Richard Arculus, Emeritus Prof. Vickie C. Bennett, Prof. Andrew Berry, Prof. Jochen J. Brocks, Dr. Antony Burnham, Emeritus Prof. Ian Campbell, Dr. Ana Casas Ramos, Dr. Marnie Forster, Prof. Trevor Ireland, Prof. Dorrit Jacob, Prof. Penelope King, Prof. John Mavrogenes, Dr. Seann McKibbin, Dr. Laura M. Otter, Dr. Zachary Sudholz, Emeritus Prof. Ian Williams, Honorary Prof. Lesley Wyborn

Geochemistry Overview

2023 was a successful year for the Geochemistry Research Area. We published peer-reviewed papers on a range of different topics within our overall strategic research directions of critical minerals and deep earth processes. Of particular note was our success in being awarded an ARC Industrial Transformation Training Hub as part of a consortium of universities, including as well as ANU the Universities of Adelaide, Queensland and Western Australia. The training centre will commence in mid-2024 and will be named the "ARC Training Centre in Critical Resources for the Future". This will enable recruitment of postdoctoral fellows and PhD students to work on a range of projects around the geology and metallurgical processing of critical metals deposits. We were also awarded ARC Discovery (DP24) and Linkage Project (LP24) funds for additional projects in critical metals. We were awarded nearly $85,000 from the ANU's Major Equipment Committee for a Laser Induced Breakdown Spectrometer (LIBS) to allow trace element mapping in our ICPMS labs, part of a general update of our trace element and isotope micro-analytical capabilities in ICPMS.

Our collaborative programs with government agencies such as Geoscience Australia and CSIRO continued, as well as our significant contributions to the MINEX Co-operative Research Centre and the National Argon Map. We were also awarded beamtime at several Australian and international synchrotrons, allowing us to continue our world-leading approach of using synchrotron sources to investigate experimental and natural samples.

In undergraduate education program, we continued to teach at a higher rate than other parts of the School, mainly into the geology stream of the School's curriculum.



A back-scattered electron image of a high pressure experimental run showing primary and quench monazite crystals in a quenched carbonate-phosphate melt. Courtesy Srijita Ray, PhD student in Experimental Petrology.

Geochemistry Cont.

Staff News

The SHRIMP Laboratory has had a busy year recruiting staff to work within the new workflow aimed at high-level analytical support for researchers. Dr. Yue Wang is now the SHRIMP Lab Manager, Dr. Jiade Wu joined the group as a SHRIMP Lab technologist, and post-doctoral fellow, Dr. Qing Zhang, was hired to expand applications in some emerging areas.

Dr. Richard Stern from the Canadian Centre for Isotopic Microanalysis at the University of Alberta was seconded to the SHRIMP Lab for the year as a special advisor to guide the laboratory through the many changes in laboratory personnel and operations. His efforts in significantly improving the SHRIMP labs operations overall are very much appreciated.

Emeritus, Honorary staff and Visitors

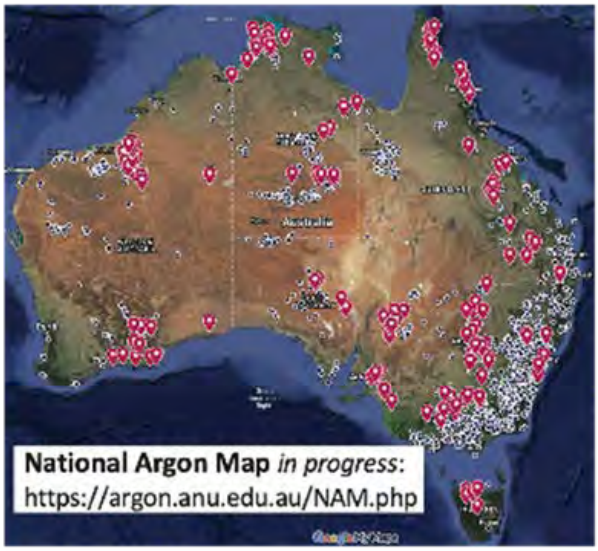
We are eternally grateful to our emeritus staff, in particular Prof. Ian Williams for his tremendous efforts in helping the SHRIMP operation prosper, A/Prof. Lynton Jaques for his highly commendable engagement with our PhD students and academics in Experimental Petrology and Vickie Bennett for her ongoing and outstanding contributions particularly in relation to the TIMS lab. George Gibson is also thanked for his contributions to our ore deposit research activities.

Extended travel and outcomes

Greg Yaxley spent 4 months working in the Institute for Geoscience at the Goethe University, Frankfurt, Germany, funded by a fellowship from the Alexander von Humboldt Foundation.

Argon, Structure and Tectonics

Associate Professor Marnie Forster continued her leadership of the ANU node of MinEx CRC, with continued progress of the National Argon Map highlighted as a potential critical success factor for the National Drilling Initiative (NDI) and the final phase [2024-2027] of the MinEx CRC. Her group is heavily involved in MinEx CRC Phase Two, which involves Ar/Ar research in geochronology and thermochronology, involving the timing and nature of the fluid and thermal history of key regions across Australia. She has been successful with two Opportunity Fund Awards: “Getting the most out of your date” and presently “Bar coding Metallogenesis”.



Geochemistry Cont.

The new project involves the Geological Surveys from Western Australia, South Australia, New South Wales, Queensland and Geoscience Australia, Anglo Gold Ashanti, and the University of South Australia. The project was massively oversubscribed, with a broad swathe of case studies to determine critical fingerprints in the timing sequences and characterisation of terrane-scale metasomatic and mineral systems. At least one major explorer has honed in on the methodology to assist with its efforts in targeting greenfield terranes. At a minimum the project will provide considerable and diverse information from small samples, and support planning for future NDI targets. It will provide context for results in terms of prospectively and metallogenetic fertility, in particular aiding the search for critical and strategic metals.

Earth Systems Chemistry

The SHRIMP Lab underwent major refurbishments this year.

SPEC-E Lab installed a new nitrogen glove box, furnaces and other sample preparation equipment.



Prof. King (co-lead) and Dr. Casas Ramos, in collaboration with Prof. Ting (RSC - co-lead) were awarded a MEC grant with the project “New facility to test gas and liquid interactions with solids”.



Dr. Casas Ramos participated in various media outreach opportunities to provide insights into the volcanic activity in Iceland and Indonesia (ABC News).

Earth Systems Chemistry (continued)

Staff News

Professor Vickie Bennett retired from her staff position to become the first female Emeritus Professor at RSES and will continue her research activities as part of the Geochemistry area.

We welcomed Yue Wang as the Senior SHRIMP technician and Jiade Wu as a SHRIMP technician.

We welcomed Richard Stern to the SHRIMP laboratory as a Visitor.

We farewelled Vivian Xiao and Bei Chen.

Student News

New starters:

- Jack Brady (Hons Engineering with King) Laser Surface Modification to Increase the Surface Area of Olivine for Carbonation

Emeritus, Honorary staff and Visitors

Emeritus Dr. Marc Norman - student supervision, collaborative national and international research, outreach. A. B. Edwards award (Geological Society of Australia).

Extended travel and outcomes

Dr. Ana Casas Ramos attended the IAVCEI conference in New Zealand.

Prof. Vickie Bennett attended the Goldschmidt Geochemistry Conference in Lyon, France, where she presented an invited talk.

Prof. Vickie Bennett attended and presented a talk at the 6th International Archean conference, Perth, Australia.

Prof. Vickie Bennett was an invited discussion leader for the Geochronology Gordon Research Conference, Mt. Snow, Vermont.

Prof. Penny King attended the Lunar & Planetary Science conference in Houston and gave invited talks at NASA Goddard and SUNY Stonybrook.

Dr. Marc Norman attended the annual meeting of the Geological Society of America in Pittsburgh, Pennsylvania, as one of six Science Editors for the Society's flagship journal GEOLOGY.

Ms. Rachel Kirby attended the Lunar & Planetary Science conference in Houston, visited Rutgers University where she gave an invited talk and visited the University of Maryland.

Dr. Lesley Wyborn attended the AGU Fall meeting in December and presented two posters and attended the IGSN General Assembly and a OneGeochemistry Board meeting.

Dr. Lesley Wyborn attended the Earth Systems Information Partners meeting, led 3 sessions and attended the Executive Board meeting.

Geochemistry Cont.

Geobiology

Overview

It is a major scientific puzzle why modern complex cells—eukaryotes with a nucleus, including animals, fungi, plants, and single-celled protists—rose to prominence very late in geological history. This mystery is based on the scarcity of eukaryotic microfossils older than 800 million years and the absence of steranes, the molecular fossils of eukaryotic sterols. In a breakthrough discovery published in Nature in 2023, staff and students of the Geobiology group demonstrated that deep ancestral eukaryotes (stem-group eukaryotes) likely thrived in abundance since at least 1,600 million years ago but had remained largely hidden because their sterols had unexpected, primordial structures. Similar to the rise of mammals after the extinction of dinosaurs, the discovery implies that primordial eukaryotes needed to decline before our modern eukaryotic ancestors emerged. The revelation fundamentally reshapes our understanding of eukaryote evolution and early ecological history.

The work received three commentary articles in Nature and Science and achieved an AltMetric media impact score of 2,709 — the highest ever achieved by ANU-led research outside climate and medical news, placing it into the top 0.3% of all publications in Nature. National Geographic elected the work into "The 11 most astonishing scientific discoveries of 2023".

- News and Views article in Nature: doi: https://www.nature.com/articles/d41586-023-01816-1
- News article in Nature: https://www.nature.com/articles/d41586-023-01847-8
- News – Chemistry article in Science: https://www.science.org/content/article/how-did-cholesterol-evolve-oil-trapped-ancient-rocks-hides-clues
- Youtube feature: https://www.youtube.com/watch?v=p0Sm179PlMw



Credit: "Artists impression of 1.6 billion-year-old organisms of the 'Protosterol Biota' (Orchestrated in MidJourney by TA 2023).

Geobiology (continued)

Staff News

Professor Jochen Brocks was promoted to Professor level E2.

PhD student Tharika Liyanage submitted her thesis and won an Agouron Fellowship to Stanford University.

PhD student Caleb Bishop was hired in a continuing position at Geoscience Australia as Hydro-sedimentologist even before finishing his thesis.

Student News

PhD Theses Submitted:
- Tharika Liyanage
- Jordan Kinsely

Emeritus, Honorary Staff and Visitors

Honorary Professors
- Neil Williams (former CEO of Geoscience Australia)
- Clinton Foster (former Chief Scientist of Geoscience Australia)

Outreach Activities & Service Roles External to ANU

Jochen Brocks collaborated with media company 'Kurzgesagt/In a Nutshell' to create an educational animation that shows '4.6 billion years of evolution in 60 minutes'. https://www.youtube.com/watch?v=S7TUe5w6RHo, https://sites.google.com/view/sources-timeline/startseite?authuser=2

Jochen Brocks was a participant and scientific advisor for KBS, the 1st Korean TV Channel, for a three-hour documentary on the role of glaciations on the evolution of life, including, five days of filming in the ANU laboratory and in the Flinders Ranges.

Jochen Brocks was interviewed about the discovery of the 'Protosterol Biota' on APAC network. https://apacnetwork.com/story/reframing-our-understanding-of-evolution/

GEOPHYSICS

Group leader Prof. Hrvoje Tkalčić

Academic Members Dr. Caroline M. Eakin, Prof. Rhodri Davies, Dr. Sia Ghelichkhan, Dr. Mark Hoggard, Dr. Chengxin Jiang, Dr. Voon Hui Lai, Dr. Xiaolong Ma, Prof. Meghan S. Miller, Prof. Louis Moresi, Dr. Thanh-Son Pham, Dr. Zhi Wei, Dr. Robert Pickle, Prof. Malcolm Sambridge, Adj. Prof. Phil Cummins, Em. Prof. Steve Cox, Em. Prof. Ian Jackson, Em. Prof. Brian Kennett

Overview

2023 was a productive year working across a range of passive-seismic imaging projects. In terms of field campaigns, Caroline Eakin led the installation of 20 broadband seismometers for SNAKEY (Seismic Network Around Kangaroo Eyre Yorke) in South Australia, which will operate for 18-24 months. This data will be used to continue our studies over the eastern margin of the Gawler Craton. The SWAN (South West Australia Network) broadband deployment as part of an ARC Linkage Project with GSWA concluded in late 2023 to study the seismicity and image the Yilgarn Craton.

Installing seismometers in South Australia for the new AuScope deployment: #SNAKEY (Seismic Network Across Kangaroo Eyre Yorke).



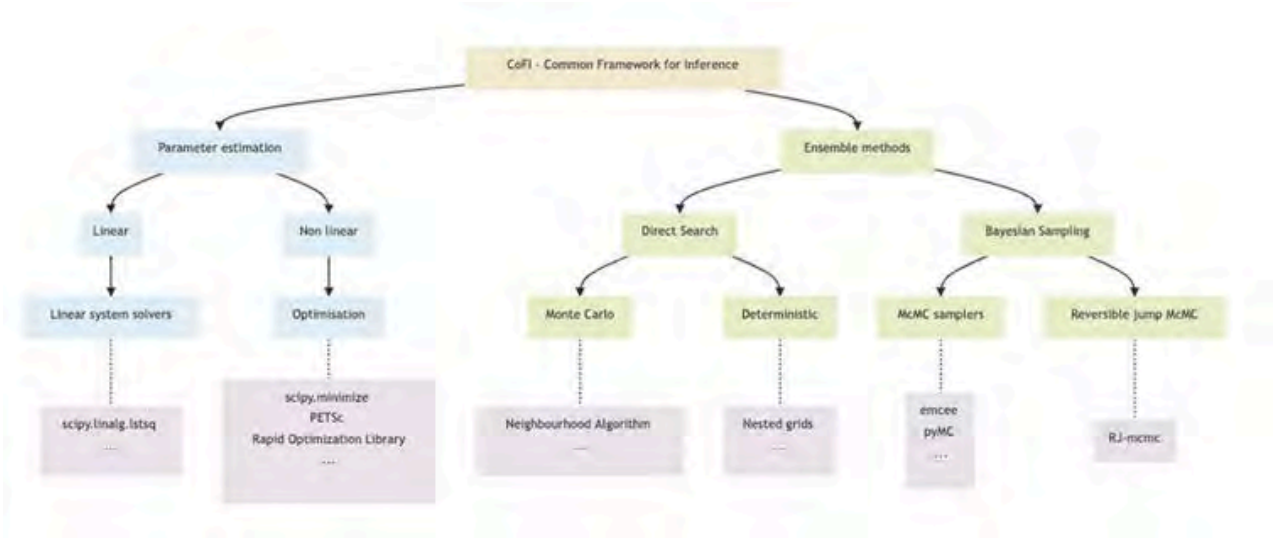
Geophysics Cont.

There were multiple seismological field campaigns in New Zealand in 2023. As part of Meghan Miller's Future Fellowship, the first was the first Distributed Acoustic Sensing (DAS) experiment across the Alpine Fault. The DAS deployed for one month between February and March 2023 utilised ~25 km-long telecommunication fibers running roughly parallel and perpendicular to the Alpine Fault near Haast. A key goal of this DAS deployment and planned further work is to improve characterization of natural hazards in southern New Zealand including Alpine Fault seismicity and rockfalls, and to demonstrate the feasibility of DAS studies using dark commercial telecommunications fibers in New Zealand. DAS, with its high spatial (~1 m) and temporal (1 kHz) resolutions, can improve the detection of weak seismic sources, including low-magnitude earthquakes diagnostic of fault activity, rockfalls and avalanches in remote mountainous regions, and sediment transport in river systems.

Several new major projects started towards the end of the year including a CRC-P with H2EX to explore for natural hydrogen in South Australia (Eakin, Jiang, Miller, Moresi), and a new research collaboration with GSWA to study seismic anisotropy, structure, and seismicity beneath the WA-Array (Eakin, Miller, Pickle, Mousavi, Zhang).

Robert Pickle led a nodal and broadband seismic deployment around Auckland in mid-2023 with Kimberley Berends and Meghan Miller. These ~150 nodal instruments were then deployed around Wairakei near Lake Taupo, New Zealand in an experiment led by Chengxin Jiang with Meghan Miller.

During the year we continued with the Common Framework for Inference project (CoFI). This is an open source software project enabling access to advanced inference software across the physical sciences. It is an initiative of InLab (The Inference Lab - http://inlab.au/) which is run out of the Geophysics Area. Our software network has expanded this year with new optimisation and probabilistic sampling tools applied to an ever expanding set of examples and tutorials. This year we also carried out a project with students through the Techlauncher initiative, where we built an interactive explorer tool to discover the ever-expanding inference methods and applications that CoFI contains. You can see it for yourself at https://inlab.au/inlab-explorer/.



Overview of the inference tools available through CoFI.

Geophysics Cont.

2023 was an excellent year for computational geodynamics, with several state-of-the-art community tools and high-impact publications. In terms of infrastructure, we made rapid progress towards the development of a computational infrastructure for adjoint-based inverse geosciences (https://gadopt.org/). This work, funded by significant cross-NCRIS (ARDC, AuScope, NCI) funding, underpins much of our ongoing research efforts, and those of a growing community of developers and users within Australia and internationally. Key areas of focus in 2023 were: a) Mantle and lithosphere dynamics, b) Glacial isostatic adjustment, c) Adjoint-based optimisation problems, d) Groundwater flow, e) Multi-material simulations.

Central themes for research in 2023 were: (i) dynamical mechanisms underpinning volcanism both within and across tectonic plate boundaries; (ii) constraining dynamic topography, the response of Earth's surface to underlying mantle flow, both in space and time; (iii) the geodynamical environments underpinning mineralisation; (iv) understanding the response of Earth's surface and global sea level to melting polar ice sheets; (v) reconciling geophysical and geochemical constraints on mantle structure and evolution; (vi) quantifying key controls on the dynamics of subduction and its relationship to plate tectonic histories at Earth's surface; and (vii) identifying nuclear explosions using novel mathematical algorithms.

We undertook a year-long research collaboration with Geoscience Australia to characterise the sedimentary cover across Australia with passive seismic methods. This began in earnest with the arrival of Auggie Marignier as a postdoctoral fellow to the group at the start of the year and has been very successful with results.

Another new postdoctoral fellow, Tom Merry, worked on upper mantle dynamics beneath the African continent, applying a novel technique to investigate lateral gradients in seismic anisotropy.

Postdoctoral fellow Zhi Wei has been working on the Macquarie Ridge Complex tomography using state-of-the-art adjoint tomography method. Postdoctoral fellow Sheng Wang has been working on the seismicity of the Macquarie Ridge Complex region using machine learning/artificial intelligence combined with other contemporary methods and applications to the waveform data recorded by our 2020/2021 voyages supported through the ARC, AAD and NERC. Both Wei and Wang also worked on advancing theoretical aspects of coda-correlation tomography with practical applications to image the Earth's mantle.

Our research has been well-received across the national and international Earth sciences community, with several group members giving invited talks at major national and international conferences, and some studies attracting significant media attention. In addition, our work has received ongoing support through several partnerships and funding awards, across academia, government, and industry. The group continues to focus on fundamental science, whilst simultaneously tackling problems of societal, environmental, and economic importance.

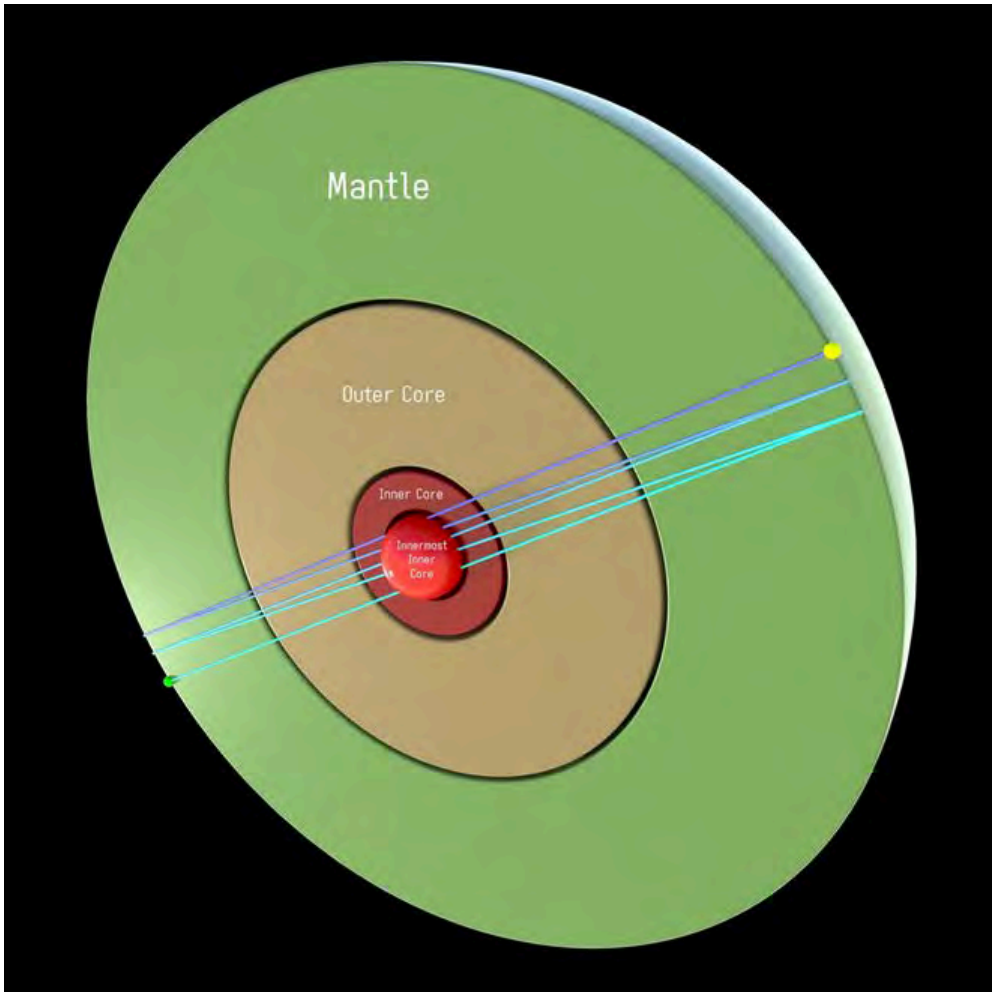
Specific research achievements

Several new insights on the Gawler Craton were published that utilised data collected by the Lake Eyre Basin Seismic Array, which operated from 2019–2022. Such publications included (i) removing sediment reverberations to retrieve more accurate estimates of the crustal thickness (e.g. Agrawal et al.; Tectonophysics), and (ii) revealing the pattern of lithospheric deformation 1.6 billion years ago still preserved today by seismic anisotropy (Eakin et al.; G-cubed).

From the travel time of seismic waves that traverse the Earth's core, we confirmed (Tkalčić; AGU Monograph) that the properties of the Earth's inner core in the very centre are different from its upper parts. Namely, the waves in the innermost inner core travel the slowest at an angle of about 60 degrees relative to the Earth's rotation axis. In the upper parts of the inner core, anisotropy is different, with the slowest waves in the equatorial plane.

Geophysics Cont.

Led by ARC DECRA Fellow Son Phạm, we confirmed the innermost inner core, but this time with a new technique - using “ricochet waves” that travel along the Earth's diameter through its strict centre up to five times – observed and documented for the first time in seismology (Phạm and Tkalčić; Nat. Commun.). The transition from the innermost to the upper inner core is not as sharp as in other layers of the Earth, which is why the innermost inner core is only subtly different from the rest of the inner core. Our paper achieved an Altmetric Score of 1885 and was featured widely, including on the cover of the New York Times.



A simple illustration of the ricochet waves through the Earth’s innermost inner core (Phạm and Tkalčić, Nature Communications, 2023). This illustration appeared on the front page of New York Times, and other outlets worldwide.

With PhD student Nita Sebastian, we investigated the properties of the lithosphere of the northeastern part of China using methods based on records of distant earthquakes on individual instruments. Our profiles showed all the complexity of this part of the world, something we are still working on (Sebastian et al.; Frontiers of Earth Sciences).

With PhD student Thuany Costa de Lima and Drs Son Phạm and Xiaolong Ma, we estimated the velocity of shear waves through the Earth’s inner core using a state-of-the-art correlation method and reported our findings in Nature Communications. The lower speed than previously thought (including our previous work published in the journal Science in 2018) requires a re-evaluation of the composition of the chemical elements of the inner core, atomic properties, crystallographic structure of iron and the solidification process.

Geophysics Cont.

In a paper published in the Journal of Geophysical Research led by postdoc Sheng Wang, we extended the last year's result (published in Nature Astronomy) by demonstrating how a correlation wavefield can be generated using a single receiver and the similarity between earthquake/meteorite impact sources. We applied this principle to scanning planetary cores and measuring the radius of Mars' core. The paper was featured in the AGU editorial.

With PhD student Jinyin Hu, and Dr. Son Phạm, we published a paper on the physics of seismic sources in the Geophysical Journal International. We have shown how, in addition to noise in the data (e.g. due to errors in measurements), the uncertainty that is present due to insufficient knowledge of the theory, e.g. the Earth's structure, can also be included in the analysis. This led to a more accurate determination of the parameters of earthquakes and nuclear explosions. It is a step forward in forensic seismology.

We concluded the year with a review of Earth's cores in Nature Communications, led by our former ARC DECRA Fellow, Lauren Waszek. We concluded that in addition to artificial intelligence and the proliferation of instruments for better spatial coverage of the deep interior of the Earth, we could employ the correlation wavefield as one of the promising methods that will mark the research on the Earth and other planets in the next decade.

Staff news

- Professor Louis Moresi was elected Fellow of the Australian Academy of Science.
- Professor Hrvoje Tkalčić was promoted to ANU level E2.
- Dr. Xialong Ma left for a research position in China.
- Professor Louis Moresi was promoted to ANU level E2.
- Dr. Thanh-Son Phạm was promoted to ANU level B.
- Early Career Researcher Dr. Voon Lai was promoted to Lecturer level B.
- Early Career Researcher Dr. Sia Ghelichkhan was promoted to Lecturer level B and was later promoted to a tenure-track position funded by the Institute for Water Futures and embedded in RSES. He officially started in the latter position on December 1, 2023.
- Dr. Zhi Wei started as a postdoctoral fellow.
- Dr. Tom Merry started as a postdoctoral fellow.
- Dr. Auggie Marignier started as a postdoctoral fellow.
- Dr. Fabrizio Magrini joined the group.
- Dr. Auggie Marignier joined the CoFI club during the year.

Student news

- Mr. Matthias Scheiter submitted his thesis during the year and was awarded his PhD.
- Mr. Shubham Agrawal completed his PhD and is now working as a postdoctoral fellow at the University of South Carolina.
- Ms. Fangqin Chen completed her PhD on the dynamics of subduction.
- Mr. Haoran Du completed his MPhil.
- Mr. Yun-Ze Cheng commenced his PhD on the planetary seismology topic.
- Ms. Ammu Bindhu Sanjayan commenced her PhD on Antarctic seismology topic.
- Ms. Ruby Turner commenced her PhD in inverse geodynamics.
- Mr. Haining Chang commenced his PhD on the dynamics and topographic expression of mantle plumes.
- Shihao Jiang, Leon Bilton and Abhay Pandey presented their research at the American Geophysical Union Fall Meeting in San Francisco.

Geophysics Cont.

Emeritus, Honorary staff and Visitors

Geophysics area hosted the Kennett Symposium in Canberra 7–9 May 2023, attracting many Australian and international participants. The symposium celebrated the 75th birthday of Professor Emeritus Brian L. N. Kennett and his research contributions that have been recognised internationally in many ways. The most recent recognition was the Reid Medal (2023) from the Seismological Society of America. Prof. Kennett's former and present students, postdocs and collaborators were among the participants, and the program consisted of more than 25 talks and 30 posters. More information about the event can be found here: https://auspass.edu.au/Symposium/Kennett/index.html

Kaustubh Raj was a visiting student under the Future Research Talent program.

Outreach activities & Service roles external to ANU

Prof. Tkalčić and the Warramunga Station team were featured in Catalyst, ABC's flagship science documentary series presented by Sarah McKay on the episode about sound.

The paper on the ricochet waves and the innermost inner core in Nature Communications (Pham and Tkalčić, 2023) has generated the Altmetric Attention score of 1884, 344 media items across TV, radio, print and online. These items reached a total potential audience of 48+ million (counting entire online audience, print circulation, and broadcast audience) and a baseline audience of 2.4+ million (counting average readers per online article, total print circulation, and total broadcast audience). Media highlights include the front page of The New York Times, BBC News and BBC World Service, CNN, Reuters, Washington Post, Forbes Magazine, NBC News, National Geographic, New York Post, Scientific American, Good Morning America, Daily Mail UK/Australia, 7 News (TV), 9 News digital, Sydney Morning Herald/The Age, New Zealand Herald, AAP, Herald Sun, The Australian, Cosmos Magazine, Space.com, multiple ABC radio and commercial radio outlets. Apart from the English-based outlets, many non-English speaking countries' leading TV channels, radio broadcasts, podcasts, and newspapers reported on the discovery, including Reuters and SBS.

The Australian Seismometers in Schools network maintained the 50 seismometers located in high schools across Australia. Drs. Michelle Salmon and Sima Mousavi visited schools and engaged with remote teachers in support of the project. AuSIS data is available through the AuSpass data server and via international agencies for outreach and research uses. Dr. David Heslop joined the project this year in a part time capacity and is leading the web redevelopment project and providing oversight across all operations.

Geophysics Cont.

The second G-ADOPT workshop, held at the ANU, in September 2023.



Edgar Leong investigating the Mary Kathleen mine in northwest Queensland.



GEOCHEMICAL INSTRUMENT OPERATIONS

Group leader Brett Knowles

Staff Joseph Cali, Bei Chen, Hahjung Chin, Bowen Fang, Michael Förster, Bin Fu, Robin Grün, Janet Hope, Xuan Ji, Laura Rodriguez Sanz, Davood Vasegh, Yue Wang, Jiade Wu, Yang Wu, Wei Xiao, Sonja Zink

The Geochemical Instrument Operations team is staffed with technical experts in range of analytical and geochemical techniques, and as such the team is able to provide support to research and teaching within RSES and ANU by resourcing and maintaining core analytical facilities within the School. Laboratories overseen by the team include the secondary-ion mass spectrometry (SIMS) SHRIMP lab, thermal ionisation mass spectrometry (TIMS), trace wet chemistry, gas chromatography mass spectrometry (GCMS), stable isotope mass spectrometry, scanning electron microscopy (SEM), photo-induced force microscopy (PiFM), RAMAN spectroscopy, x-ray diffractometry (XRD), argon-argon geochronology, and laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS).

This year the team welcomed fresh faces and farewelled familiar faces. Ulrike Troitzsch left in 2022 to take on a 12-month secondment in the Research School of Physics and during 2023 had that secondment converted to a continuing role, so we farewell and wish Ulli the very best. Vivian Xiao expertly covered for Ulli's absence in the Spectroscopy Facility, overseeing a smooth transition while managing XRD, PiFM, and RAMAN instrumentation alongside Yang Wu. We welcomed Michael Förster from Macquarie Univeristy to take over from Vivian in a continuing capacity, and we farewell and thank Vivian for all of her hard work. Michael is one of very few PiFM experts in geoanalysis in the world, and is active in research of new techniques and analysis of a range of minerals with this new technique.

After close to ten years of service with the RSES we farewelled Bin Fu as he was offered and accepted an academic position with the Chinese Academy of Sciences Institute of Geochemistry. Congratulations to Bin Fu on this wonderful achievement. We also farewelled Robin Grün from the ICP-MS Facility after 12 months with the team, we welcomed back Laura Rodriguez Sanz (congratulations Laura and Peter on the birth of baby Mia!) following her maternity leave and again farewelled Joe Cali. We welcomed to the team Hahjung (Jay) Chin from Nanyang Technological Unversity in Singapore, who brings with her over a decade of analytical experience.

We also farewelled Bei Chen following her 12 months managing the SHRIMP SIMS Facility under the guidance of Ian Williams. Yue Wang was successfully appointed as the full-time ongoing lab manager for the SIMS Facility. During the latter half of the year, we were glad to also host Richard Stern from University of Alberta, Edmonton, who alongside Ian and Yue was instrumental in streamlining and modernising the way customers and researchers interact with and use this world-class facility. This team also appointed a lab assistant, Jiade Wu, who joined the team to add extra hands and brains to the team to help meet the demands of this facility. Finally, we welcomed to the team Bowen Fang to manage our JEOL SEM in the Jaeger 4 building, while Xuan Ji finished her term managing the Boron clean lab to return to finalising her PhD thesis.

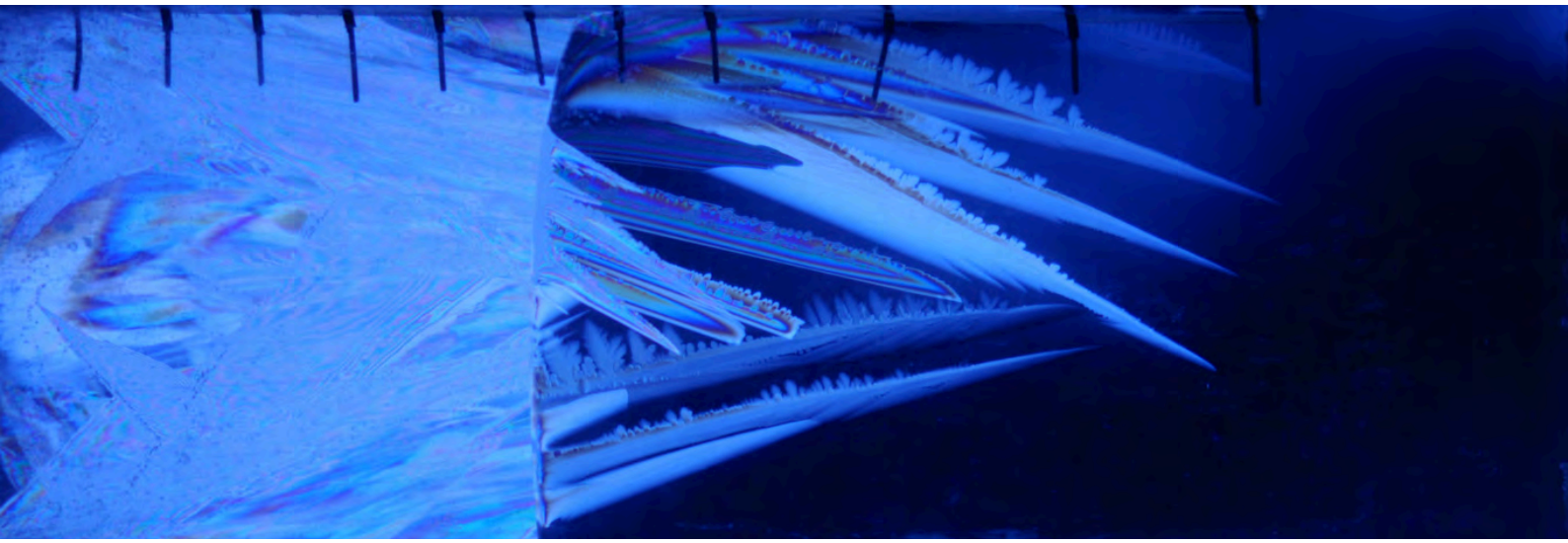
Geochemical Instrument Operations (continued)

The Spectroscopy Facility in the Jaeger 3 building has seen continued development over the past 12 months. A successful major equipment committee (MEC) grant bid by Laura Otter saw the purchase and install of a new bridging laser to remove spectral 'gaps' when taking PiFM measurements. Further adding to this facilities' capabilities the Horiba LabRAM Soleil confocal Raman microscope was installed and validated. Instrument install and method validation was overseen by Vivian, Yang, and Michael in a range of capacities.

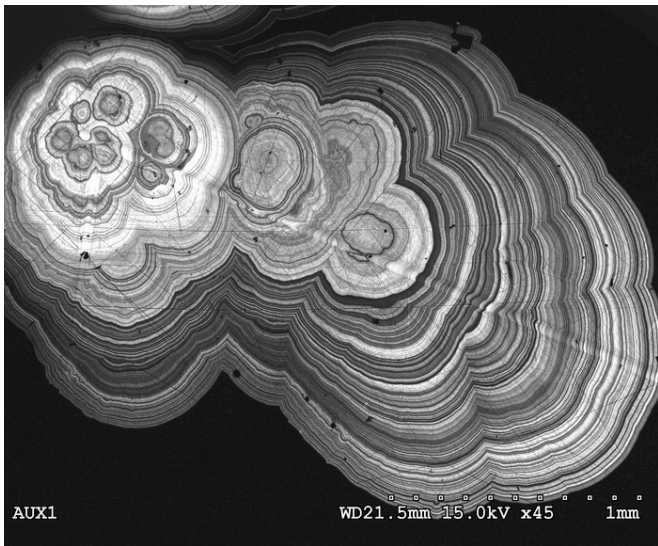
Our SHRIMP SIMS facility continues to operate and innovate under the guidance of Ian, Yue, Jiade, and Richard. Online project and data management has been improved and the facility itself has undergone a 'facelift'. Lab benches and infrastructure were refreshed following extensive planning, and a new sample preparation facility was fitted out within the Jaeger 5 building. This facility has all-new equipment and a carefully-considered workflow within a short distance of the SIMS lab to enable close and careful oversight of all steps of sample preparation and analysis by our lab staff, ensuring the best analytical results.

Finally, another MEC bid submitted by Greg Yaxley was successful to add laser-induced breakdown spectroscopy instrumentation to the LA-ICP-MS Facility. Using this technique, we will be able to capture the spectral information generated by elements present in samples subjected to each pulse of a 193 nm excimer laser to enable fast mapping and possibly rapid quantification of mineral samples undergoing LA-ICP-MS, effectively doubling the information we can collect for a given LA-ICP-MS session. We took delivery of our MEC-funded new 193 nm excimer lasers (two Coherent ExciStar200 units) which will see us continue to carry out 193 nm laser ablation of a range of mineral and biomineral samples using HelEx sample cells for years to come.

Credit: Olivia Berti (top) , Christina Loidolt (lower left), Chris Ingles (lower right)







GEOPHYSICAL DATA AND COMPUTATION

Group leader Herb McQueen

Staff Julian Byrne, Rajesh Erigela, Angus Gibson, Kathryn Hayward, Jiawen He, Paul-Hyde Kaduru, Sima Mousavi, Michelle Salmon, Ramkumar Voore

Geophysical Data and Computation staff support data collection, data management, processing, simulation, and analysis facilities in RSES. These include a large collection of seismic monitoring equipment supporting a national fieldwork capability, several special and general-purpose computing and data acquisition systems and local compute clusters, and programming support for processing on these and NCI supercomputer facilities.

Through the Australian Seismometers in Schools (AuSIS) program we operate a network of seismometers installed at 48 schools across the country. The program provides support for technical staff at the schools and the teachers who are using the AuSIS equipment in class work. Data from the sites is transmitted to ANU and made publicly accessible on our Australian Passive Seismic Server (AusPASS) and other international datacentres.

Several major new equipment purchases were made during 2023 to expand the seismic instruments pool shared with Australian institutions through the ANSIR facility.

These acquisitions include:

- 34 Nanometrics Centaurs
- 100 SmartSolo IGU-BD3C-5 broadband nodes
- 362 SmartSolo IGU-16HR 3C short period nodes
- 20 Trillium Compact seismometers
- 20 Trillium Posthole seismometers
- 3 Silixa iDAS fibre-optic distributed acoustic sensors

Orders were also placed for 50 more ANU Terrasawr seismic recorders, and we took delivery of a new Landcruiser twin cab utility to support the seismic field program.

A new small Dell cluster of servers was set up to enhance computational capacity and provide local access to high power GPU processors. The "ceres" cluster consists of three Dell R750 servers and four Dell R650 servers with high speed NVME storage areas and Ampere A100, A30 and L40 GPUs, connected through a 10GB switch. This adds to the kaiju and Terrawulf-3 clusters which continue to support RSES staff and students.

LABORATORY OPERATIONS

Group leader Andrew Latimore

Staff Electronics Group - Andrew Latimore, Peter Lanc, Hideo Sasaki, Yile Liu
Mechanical Facility/ Rock Physics High Pressure Lab - Hayden Miller
Paleoenvironments - Pengxiang Hu, Yao Qian
Climate and Fluid Physics Laboratory - Angus Rummery
Experimental Petrology - David Clark
Radiocarbon Dating Laboratory - Rebecca Esmay

Introduction

The RSES Laboratory Operation Group refers to a team of technical and research support staff whose roles underpin the Research School of Earth Sciences' academic research by maintaining vital instrumentation infrastructure. The Group is structured around key scientific facilities including, Electronics Group, Mechanical Facility, Palaeomagnetic Laboratory, Climate and Fluid Physics Laboratory, Experimental Petrology Laboratory and Radiocarbon Dating Laboratory. These Laboratories provide the Research School of Earth Sciences with vital analysis capabilities and are maintained by the professional staff of the Laboratory Operations Group.

The Electronics Group and Mechanical Facility provide Electronic and Mechanical Engineering services to support Research School of Earth Sciences' and Australian National University's academic innovations. The areas hold the responsibility for maintaining and servicing electronic systems within RSES and offer a development facility able to engineer innovative electronic/mechanical solutions. The Electronics Group is equipped with a circuit production facility utilising an automated component placement machine and reflow oven.

Together, the RSES Laboratory Operation Group endeavours to ensure the Research School of Earth Sciences remains a state-of-the-art institution and achieves the strategic goals of the University.

Electronics Group

During 2023 the Electronics Group installed and tested the second generation of ultra-low bias current electrometer, the Cvar-PRO, onto SHRIMP SI (Sensitive High Resolution Ion Microprobe Stable Isotope). This project was a combination of many hours work developing low noise, low bias current electronics incorporating a sapphire insulated input node and capacitive charge mode technique, and the development of digital control to stabilise the device. This achievement allows the SHRIMP instruments to analyse Ion counts per second below previous levels from traditional resistive feedback electrometer designs.

Laboratory Operations (continued)

The Electronics Group further developed and improved the *terraSAWR* Seismic recorder during 2023, including progress towards a batch of 50 new units. This device was developed for RSES Seismology Department and has been successfully deployed in the field since 2010. The success of the project gives RSES a fleet of unique recorders that are lower power consumption than commercially available units. The developments this year include re-designing for component obsolescence and user interface improvements.

During 2023, Peter Lanc of the RSES Laboratory Operations Group travelled to Jinan China with a team from Australian Scientific Instruments to commission the latest generation SHRIMP V instrument. The latest generation of SHRIMP instruments contains new capabilities including sample imaging and depth profiling. Peter was commissioned to develop and enhance the LabVIEW user interface to incorporate these new features.

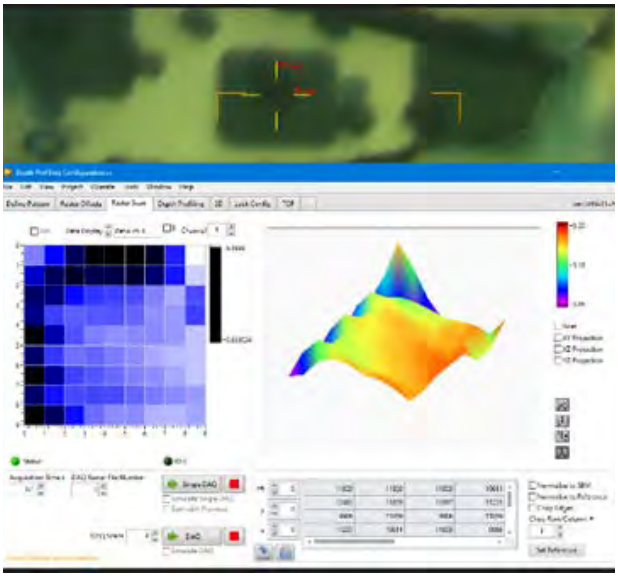


Figure 1 SHRIMP V Scanning SW

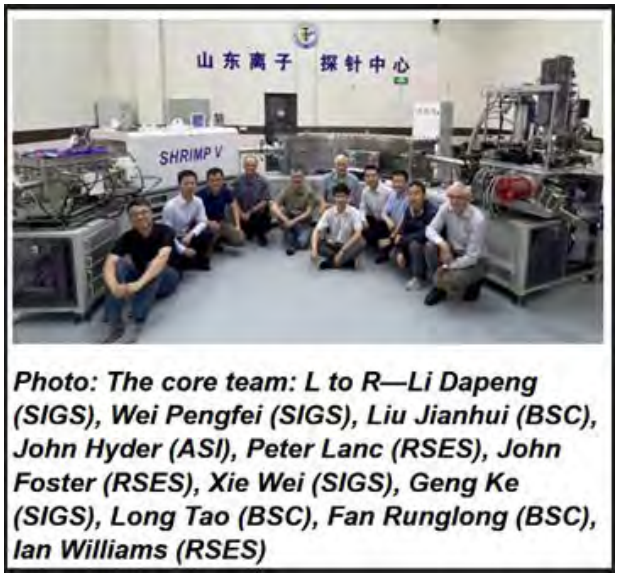


Photo: The core team: L to R—Li Dapeng (SIGS), Wei Pengfei (SIGS), Liu Jianhui (BSC), John Hyder (ASI), Peter Lanc (RSES), John Foster (RSES), Xie Wei (SIGS), Geng Ke (SIGS), Long Tao (BSC), Fan Runglong (BSC), Ian Williams (RSES)

Figure 2 SHRIMP V Jinan China

The RSES Laboratory Operations Group offers electronic and software development capabilities to ANU departments that require these services. During 2023 the Group continued to support the University with engineering projects, for example the High Flux Solar Simulator, a project based in the ANU School of Engineering. Peter Lanc developed control software to analyse and monitor flux intensity sensors and provide vital feedback to the researcher.

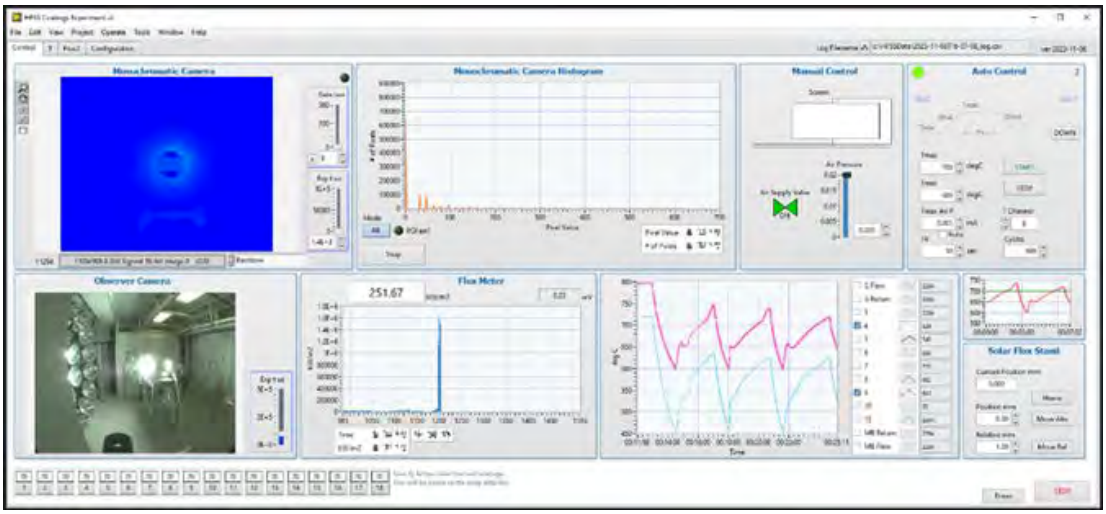


Figure 3 ANU School of Engineering: High Flux Solar Simulator control software

Laboratory Operations (continued)

Mechanical Facility

Hayden Miller successfully managed the RSES Mechanical Facility for 2023, quickly responding to all groups across RSES to assist with any mechanical issues that could negatively affect their research program.

Mechanical advice and assistance was provided to remove two 200t Hydraulic Piston Cylinder Presses from the RSES Experimental Petrology department and recommission them at the Nanyang Technological University in Singapore. This procedure was a major undertaking involving disassembling and designing appropriate lifting brackets, re-shaping the apparatus for transportation and rebuilding in the new location.

The RSES Mechanical Facility provided engineering services to fabricated parts enabling extraction of sediment core samples at isolated lake beds. The RSES Paleoenvironments department successfully utilised this device at challenging locations throughout Australia. The project included fabricating a tool designed for fine pitch threads cutting on 5 inch PVC tubes while in the field.
Further engineering projects include fabricating two ice core sampling tubes for aiding extracting ice core samples in Antarctica this past summer. This project was successfully deployed and enabled vigilant chronographic ice core sample retainment and minimises contamination.

During 2023 the Mechanical Facility was engaged with commissioning a new sample stage for SHRIMP II. The XYZ sample stage required precision mounting and alignment. Redesigning of the substructure was required to achieve this.

Experimental Petrology

During 2023 the RSES Laboratory Operations Group re-designed two in-house built high pressure apparatus to operate independently in preparation for installation at NTU Nangyang Technology University Singapore. The Group installed and tested the apparatus and trained NTU staff members with essential operational methods. The joint venture was a success and enables new high pressure Experimental Petrology capability for the NTU and also strengthens collaboration with the high pressure facility at the Research School of Earth Sciences ANU.

The Climate & Fluid Physics Laboratory

Throughout 2023, Angus Rummery from the Climate and Fluid Physics Laboratory, has developed an Ice growth experiment utilising custom built conductivity sensors. The project involves precisely measuring the temperature and electrical conductivity of sea water during the phase change. The data gathered from several locations portray a profile of salinity with depth during the freezing process. The new instrumentation includes LabVIEW analysis software developed by Peter Lanc and includes an additional 16 channel of temperature measurement working simultaneously with 12 conductivity readings.

Staff News

Professional staff promotions for 2023 include, Hayden Miller Senior Technical Officer ANUO7 and, Hideo Sasaki Senior Technical Officer ANUO6. Yile Liu's position was converted to continuing ANUO6. Yao Qian joins the Laboratory Operations Group acting in place of Pengxiang Hu.

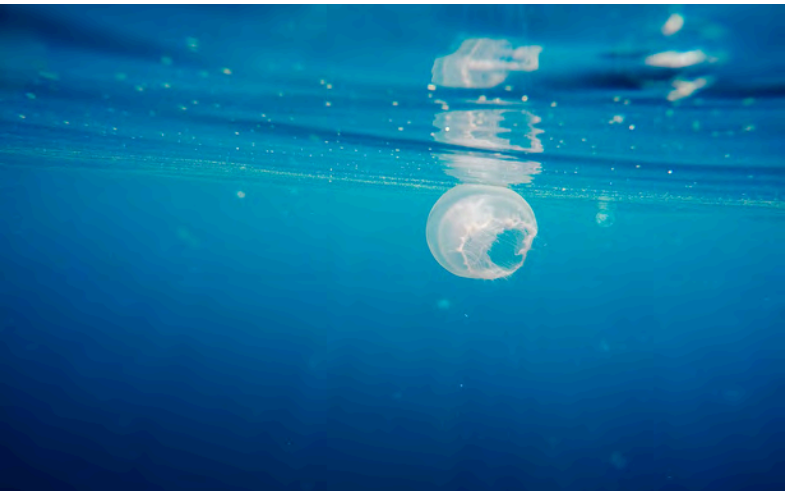
RESEARCH GRANTS AWARDED DURING 2023

Project/Grant Title	Administering Area	Lead CI	Awarded Date	Primary Funds Provider
A first-pass characterisation of the regional tectonic framework of Tonga	Geophysics	Phil Cummins	22/11/2023	Geoscience Australia
Accelerating exploration and extraction of renewable natural hydrogen (CRC-P Round 14)	Geophysics	Caroline Eakin	03/03/2023	Commonwealth Department of Industry, Science, Energy and Resources (DISER)
Advancing passive seismic imaging techniques for energy resource exploration at Canning Basin	Geophysics	Chengxin Jiang	21/07/2023	Commonwealth Scientific and Industrial Research Organisation (CSIRO)
An ensemble approach to studying the ocean's role in climate change	Climate and Ocean Geoscience	Navid Constantinou	07/03/2023	Australian Research Council (ARC)
ANU - preferred access MEX1 'XRF analysis of shale'	Geochemistry	Andrew Berry	11/09/2023	ANSTO Australian Synchrotron
ANU Futures Scheme 2.0 - Ghelichkhan	Climate and Ocean Geoscience	Siavash Ghelichkhan	02/11/2023	Australian National University (ANU)
ANU Futures Scheme 2.0 - Morrison	Climate and Ocean Geoscience	Adele Morrison	28/09/2023	Australian National University (ANU)
ANZIC Mini IODP Cores Education Project	Climate and Ocean Geoscience	Sarah Kachovich	01/06/2023	Australian IODP Office
AuScope Research Infrastructure Investment Plan (RIIP) Imaging Capital and Operations	Geophysics	Meghan Miller	07/08/2023	AuScope Ltd
Bridging the gap: Expanding ANU capabilities in Near- to Mid-Range InfraRed Nanometre Phase Characterization and Imaging	Geochemistry	Laura Otter	30/01/2023	Australian National University (ANU)
Characterisation of garnet related to critical metal-enriched U-REE-Cu-Au mineralisationin Queensland, Australia	Geochemistry	John Mavrogenes	25/07/2023	ANSTO Australian Synchrotron

Project/Grant Title	Administering Area	Lead CI	Awarded Date	Primary Funds Provider
Computing for Social Good Seed Grants 2023: Chasing Storms with AI-Enhanced DAS, Seismic and Infra-sound Arrays	ICP Environment Projects	Rhys Hawkins	01/11/2023	Australian National University (ANU)
Characterisation of garnet related to critical metal-enriched U-REE-Cu-Au mineralisationin Queensland, Australia	Geochemistry	John Mavrogenes	25/07/2023	ANSTO Australian Synchrotron
Expanding ANU capabilities in trace element analysis and quantitative imaging with Tandem Laser Induced Breakdown Spectroscopy (LIBS) - Laser ablation ICPMS (LA-ICPMS)	Geochemistry	Gregory Yaxley	30/01/2023	Australian National University (ANU)
Formation of the Archean continental crust in the eastern part of the Ukrainian Shield as revealed by U-Pb-O isotope study of zircon from igneous rocks	Geochemistry	Yue Wang	12/09/2023	Australian Academy of Science
How Large Earthquakes Change Our Dynamically Deforming Planet	Geophysics	Louis Moresi	08/03/2023	Australian Research Council (ARC)
Investigating seismic anisotropy, seismicity and structure beneath the WA-Array	Geophysics	Caroline Eakin	12/07/2023	Geological Survey of Western Australia
Molecular fossils, mass extinctions and the rise of complex algae	Geochemistry	Jochen Brocks	08/03/2023	Australian Research Council (ARC)
Post-Cruise Analaytical Funding (PCAF) 2023 - Jimin Yu	Climate and Ocean Geoscience	Jimin Yu	06/02/2023	Australian IODP Office
Project OP 8.1: Barcoding Metallogenesis	Geochemistry	Margaret Forster	10/08/2023	MinEx CRC Ltd
The carbonate geology of the critical metal niobium	Geochemistry	Gregory Yaxley	06/30/2023	Australian Research Council (ARC)
The Rare Earth Potential of the Gascoyne Region of Western Australia	Geochemistry	John Mavrogenes	09/05/2023	Australian Research Council (ARC)
Trace element substitution mechanisms in Zircon	Geochemistry	Laura Miller	05/10/2023	ANSTO Australian Synchrotron

Project/Grant Title	Administering Area	Lead CI	Awarded Date	Primary Funds Provider
Tracking flood waters over Australia using space gravity data	Climate and Ocean Geoscience	Paul Tregoning	07/03/2023	Australian Research Council (ARC)
Investigating metal mobilization in meteorites using X-ray Fluorescence Microscopy: testing an impact hypothesis	Geochemistry	Penny King, Rachel Kirby	02/2023	ANSTO, Aust. Synchrotron Grants
New facility to test gas and liquid interactions with solids	Geochemistry	Valeska Ting, Penny King, Ana Casas Ramos	04/2023	ANU Major Equipment Grant
Australian Centre of Excellence Centre for Optical Microcombs for Breakthrough Science (COMBS)	Geophysics	Meghan Miller	30/12/2023	Australian Research Council (ARC)
Subsurface Sampling - Australia New Zealand International Scientific Drilling Consortium (ANZIC)	Climate and Ocean Geoscience	Ron Hackney	19/10/2023	National Collaborative Research Infrastructure Strategy through AuScope Ltd

Credit: Kelly Kenny (top left) , Brad Pillans (lower left) Edgar Leong (right)







PEER-REVIEWED PUBLICATIONS

Abram, N.* (2023). Identifying atmospheric processes favouring the formation of bubble-free layers in the Law Dome ice core, East Antarctica. Cryosphere (ISSN: 1994-0416), 17(12), p.5155-5173. https://doi.org/10.5194/tc-17-5155-2023

Adeleye, M., Andrew, S., Gallagher, R., van der Kaars, W., De Deckker, P.*, Hua, Q., Haberle, S. (2023). On the timing of megafaunal extinction and associated floristic consequences in Australia through the lens of functional palaeoecology. Quaternary Science Reviews (ISSN: 02773791), 316. https://doi.org/10.1016/j.quascirev.2023.108263

Agrawal, S.*, Eakin, C.*, O'Donnell, J. (2023). Tracking crustal thickness at the sediment inundated edge of the Gawler Craton, South Australia. Tectonophysics (ISSN: 00401951), 862, p.1-16. https://doi.org/10.1016/j.tecto.2023.229938

Aleinikoff, J., Southworth, C., Fanning, M.* (2023). SHRIMP U-Pb geochronology of Mesoproterozoic basement and overlying Ocoee Supergroup, NC-TN: dating diagenetic xenotime and monazite overgrowths on detrital minerals to determine the age of sedimentary deposition. Canadian Journal of Earth Sciences (ISSN: 00084077), 60(6), p.583-615. https://doi.org/10.1139/cjes-2022-0093

Anenburg, M.*, Guzmics, T. (2023). Silica is unlikely to be soluble in upper crustal carbonatite melts. Nature Communications (ISSN: 20411723), 14(1). https://doi.org/10.1038/s41467-023-35840-6

Anne, M., de Boyer Montegut, C., Bozec, A., Chassignet, E., Fox-Kemper, B., Hogg, A.*, Iovino, D., Kiss, A.*, Le Sommer, J., Li, Y., Lin, P., Lique, C. (2023). The mixed-layer depth in the Ocean Model Intercomparison Project (OMIP): impact of resolving mesoscale eddies. Geoscientific Model Development (ISSN: 1991959X), 16(13), p.3849-3872. https://doi.org/10.5194/gmd-16-3849-2023

Ao, H., Rohling, E.*, Li, X., Song, Y., Roberts, A.*, Zhang, Y., Poulsen, C., Jonell, T., Liebrand, D., Sun, Q., Li, X., Qiang, X. (2023). Northern hemisphere ice sheet expansion intensified Asian aridification and the winter monsoon across the mid-Pleistocene transition. Communications Earth & Environment (ISSN: 26624435), 4, p.1-11. https://doi.org/10.1038/s43247-023-00686-9

Armbrecht, L., Focardi, A., Lawler, K., O'Brien, P., Leventer, A., Noble, T., Opdyke, B.*, Duffy, M., Evangelinos, D., George, S., Lieser, J., Lopez-Quiros, A., Post, A., Armand, L. * (2023). From the Surface Ocean to the Seafloor: Linking Modern and Paleo-Genetics at the Sabrina Coast, East Antarctica (IN2017_V01). Journal of Geophysical Research: Biogeosciences (ISSN: 2169-8953), 128(4), p.1-20. https://doi.org/10.1029/2022JG007252

Bayon, G., Patriat, M., Godderis, Y., Trinquier, A., De Deckker, P.*, Kulhanek, D., Holbourn, A., Rosenthal, Y. (2023). Accelerated mafic weathering in Southeast Asia linked to late Neogene cooling. Science Advances (ISSN: 23752548), 9(13). https://doi.org/10.1126/sciadv.adf3141

Berkesi, M., L. Myovela, J., Yaxley, G.*, Guzmics, T. (2023). Carbonatite formation in continental settings via high pressure – high temperature liquid immiscibility. Geochimica et Cosmochimica Acta (ISSN: 00167037), 349, p.41-54. https://doi.org/10.1016/j.gca.2023.03.027

Bojar, A., Lecuyer, C., Maher, W.*, Bojar, H., Fourel, F., Vasile, S. (2023). Multi-element stable isotope geochemistry and arsenic speciation of hydrothermal vent fauna (Alviniconcha sp., Ifremeria nautilei and Eochionelasmus ohtai manusensis), Manus Basin, Papua New Guinea **. Chemosphere (ISSN: 00456535), 324. https://doi.org/10.1016/j.chemosphere.2023.138258

Bojar, A., Lecuyer, C., Maher,W.*, Bojar, H., Fourel, F., Vasile, S. (2023). Refining the Moho across the Australian continent. Geophysical Journal International (ISSN: 0956540X), 233(3), p.1863-1877. https://doi.org/10.1093/gji/ggad035

Bowyer, F., J. Krause, A., Song, Y., Huang, K., Fu, Y., Shen, B., Li, J., Kun Zhu, X., Kipp, M., van Maldegem, L.*, Brocks, J.*, A. Shields, G. (2023). Biological diversification linked to environmental stabilization following the Sturtian Snowball glaciation. Science Advances (ISSN: 23752548), 9(34), p.18. https://doi.org/10.1126/sciadv.adf9999

Brand, J., Wain, A., Rode, A., Madden, S., King, P.*, Mohan, M., Kaluarachchi, W., Ratnayake, J., Rapp, L. (2023). Femtosecond pulse laser cleaning of biofilm and dirt: Preserving the Sydney Harbour Bridge. Journal of Cultural Heritage (ISSN: 12962074), 60, p.86-94. https://doi.org/10.1016/j.culher.2023.01.010

Brand, J., Wain, A., Rode, A., Madden, S., King, P.*, Rapp, L. (2023). Comparison between nanosecond and femtosecond laser pulses for the removal of spray paint from granite surfaces. Journal of Cultural Heritage (ISSN: 12962074), 62, p.329-338. https://doi.org/10.1016/j.culher.2023.06.005

Brocks, J.* (2023). Rapid encapsulation of true ferns and arborane/fernane compounds fossilised in siderite concretions supports analytical distinction of plant fossils. Scientific Reports (ISSN: 20452322), 13(1). https://doi.org/10.1038/s41598-023-47009-8

Brocks, J.*, Bobrovskiy, I. (2023). Some animals make plant sterols. Science (ISSN: 00368075), 380(6644), p.455-456. https://doi.org/10.1126/science.adh8097

Brocks, J.*, Nettersheim B., Adam, P., Schaeffer, P., Jarrett, A., Gueneli, N., Liyanage, T.*, van Maldegem, L.*, Hallmann, C., Hope, J.* (2023). Lost world of complex life and the late rise of the eukaryotic crown. Nature (ISSN: 00280836), 618, p.767–773. https://doi.org/10.1038/s41586-023-06170-w

Burnham, A.*, Chandler, R.*, Amelin, Y.*, Mavrogenes, J.* (2023). Allanite geochronology in the Mount Isa Inlier. Australian Journal of Earth Sciences (ISSN: 0812-0099). https://doi.org/10.1080/08120099.2023.2291514

Burnham, A.*, Chandler, R.*, Amelin, Y.*, Mavrogenes, J.* (2023). Allanite geochronology in the Mount Isa Inlier. Australian Journal of Earth Sciences (ISSN: 0812-0099). https://doi.org/10.1080/08120099.2023.2291514

Carrasco Godoy, C.*, Campbell, I.* (2023). Application of Onuma and lattice strain derived methods to calculate missing REE and Ce and Eu anomalies in magmatic zircons. Contributions to Mineralogy and Petrology (ISSN: 00107999), 178(7). https://doi.org/10.1007/s00410-023-02025-9

Chang, L., Hoogakker, B., Heslop, D.*, Zhao, X.*, Roberts, A.*, De Deckker, P.*, Xue, P., Pei, Z., Zeng, F., Huang, R., Huang, B., Wang, S., Berndt, T., Leng, M. (2023). Indian Ocean glacial deoxygenation and respired carbon accumulation during mid-late Quaternary ice ages. Nature Communications (ISSN: 20411723), 14, p.11. https://doi.org/10.1038/s41467-023-40452-1

Chen, C., Forster, M.*, Foley, S.*, Shcheka, S. (2023). Carbonate-rich crust subduction drives the deep carbon and chlorine cycles. Nature (ISSN: 14764687), 620, p.576-581. https://doi.org/10.1038/s41586-023-06211-4

Chen, Y., Saygin, E., Kennett, B.*, Qashqai, M., Hauser, J., Lumley, D., Sandiford, M. (2023). Next-generation seismic model of the Australian crust from synchronous and asynchronous ambient noise imaging. Nature Communications (ISSN: 20411723), 14(1). https://doi.org/10.1038/s41467-023-36514-z

Chua, S., Switzer, A., Gouramanis, C.*, Dixit, Y., Bird, M., Horton, B. (2023). Coastal response to Holocene Sea-level change: A case study from Singapore. Marine Geology (ISSN: 0025-3227), 465. https://doi.org/10.1016/j.margeo.2023.107146

Codilean, A., Fülöp, R., Wilcken, K., Koutamanis, D., Fink, D., Fifield, K.*, Wong, H., Enge, G., Vardanega, C., Rowling, B. (2023). Cosmogenic 10Be and 26Al sample preparation at the University of Wollongong. Nuclear Instruments and Methods in Physics Research: Section B (ISSN: 0168583X), 535, p.61-73. https://doi.org/10.1016/j.nimb.2022.12.003

Costa de Lima, T.*, Pham, T.*, Ma, X.*, Tkalčić, H.* (2023). An estimate of absolute shear-wave speed in the Earth's inner core. Nature Communications (ISSN: 20411723), 14(1), p.4577. https://doi.org/10.1038/s41467-023-40307-9

Costa de Lima, T.*, Pham, T.*, Ma, X.*, Tkalčić, H.* (2023). A new estimate of shear-wave speed in the Earth's inner core. Nature Communications (ISSN: 20411723), 14(4577). https://doi.org/10.1038/s41467-023-40307-9

Coward, A., Slim, A., Brugger, J., Wilson, S., Williams, T., Pillans, B.*, Maksimenko, A. (2023). Mineralogy and geochemistry of pattern formation in zebra rock from the East Kimberley, Australia. Chemical Geology (ISSN: 00092541), 622. https://doi.org/10.1016/j.chemgeo.2023.121336

Crisp, L., Berry, A.*, Burnham, A.*, Miller, L.*, Newville, M. (2023). The Ti-in-zircon thermometer revised: The effect of pressure on the Ti site in zircon. Geochimica et Cosmochimica Acta (ISSN: 00167037), 360, p.241-258. https://doi.org/10.1016/j.gca.2023.04.031

Cych, B., Morzfeld, M., Heslop, D.*, Maher, S., Gee, J., Tauxe, L. (2023). Thermal Resolution of Unblocking Temperatures (TROUT): A Method for “Unmixing” Multi-Component Magnetizations. Geochemistry, Geophysics, Geosystems (ISSN: 15252027), 24(6), p.1-19. https://doi.org/10.1029/2023GC010920

Dai, Y., Yu, J.*, Ji, X.* (2023). Prolonged deep-ocean carbonate chemistry recovery after the Paleocene-Eocene Thermal Maximum **. Earth and Planetary Science Letters (ISSN: 0012821X), 620, p.9. https://doi.org/10.1016/j.epsl.2023.118353

Davies, D.R., S. Ghelichkhan, M.J. Hoggard, A. Valentine & F.D. Richards (2023). Observations and models of dynamic topography: Current status and future directions, in Dynamics of plate tectonics and mantle convection (Ed: J.C. Duarte). Elsevier, Ch. 11, p.223–269.. https://doi.org/10.1016/B978-0-323-85733-8.00017-2

Dawson, H., Morrison, A.*, England, M., Tamsitt, V. (2023). Pathways and Timescales of Connectivity Around the Antarctic Continental Shelf. Journal of Geophysical Research: Oceans (ISSN: 2169-9275), 128(2), p.1-25. https://doi.org/10.1029/2022JC018962

De Deckker, P.*, Chivas, A.*, Mikkelson, N. (2023). On the chemistry of small waterbodies linked to marine aerosols and local geology on the Windmill Islands and mainland near Casey Station, Antarctica. Marine and Freshwater Research (ISSN: 13231650), 74(15), p.1275-1295. https://doi.org/10.1071/MF23080

De Deckker, P.*, Hancock, G., Olley, J., Stanley, S., Hope, G. (2023). The effect of the introduction of livestock on the erosion of alpine soils: a comparison of five dating techniques applied to sediments of the Australian alpine Blue Lake. Journal of Paleolimnology (ISSN: 0921-2728), 70(2), p.77-93. https://doi.org/10.1007/s10933-023-00284-x

De Deckker, P., Nanson, R. (2023). Submarine canyons and slides in the central-west Otway Basin – their morphology, genesis, links to groundwater discharge and tsunamigenic potential. Australian Journal of Earth Sciences 70, 18-39 + supplement. https://doi.org/10.1080/08120099.2022.2125070

Dickerson, P., R. Hall, B., F. Stockli, D., D. Stockli, L., Hanson, R., Fanning, M.*, O'Sullivan, P. (2023). Pre-Pangean evolution of central southern Laurentia: Insights from zircon U/Pb geochronology, Marathon-Solitario fold-and-thrust belt, west Texas. In: Laurentia: Turning Points in the Evolution of a Continent, The Geological Society of America, Inc, Boulder, Colorado, U.S, (ISBN:9780813712208), p.381-397. https://doi.org/10.1130/2022.1220(20)

Doody, J., Soennichsen, K., Bartek, B., Godwin, C., Rhind, D., Murray, C., Whitmore, T., De Deckker, P.*, Clulow , S. (2023). Mirages or miscalculations? Mass mortality of lizards in a hypersaline lake. Herpetology Notes (ISSN: 2071-5773), 16, p.415-421.

Downes, P., Jaques, L.*, Talavera, C., Griffin, W., Gain, S., Evans, N., Taylor, W., Verrall, M. (2023). Perovskite geochronology and petrogenesis of the Neoproterozoic Mad Gap Yards ultramafic lamprophyre dykes, East Kimberley region, Western Australia. Contributions to Mineralogy and Petrology (ISSN: 00107999), 178(4). https://doi.org/10.1007/s00410-023-02002-2

Duval, M., Sahnouni, M., Pares, J., Zhao, J., Grun, R.* (2023). On the age of Ain Hanech Oldowan locality (Algeria): First numerical dating results. Journal of Human Evolution (ISSN: 0047-2484), 180. https://doi.org/10.1016/j.jhevol.2023.103371

E. Regier, M., V. Smit, K., Chalk, T., Stachel, T., Stern, R., M. Smith, E., Foster, G., Bussweiler, Y., DeBuhr, C., Burnham, A.*, Harris, J. (2023). Boron isotopes in blue diamond record seawater-derived fluids in the lower mantle. Earth and Planetary Science Letters (ISSN: 0012821X), 602, p.1-12. https://doi.org/10.1016/j.epsl.2022.117923

Eakin, C.*, Davies, R.*, Ghelichkhan, S.*, O'Donnell, J., Agrawal, S.* (2023). The Influence of Lithospheric Thickness Variations Beneath Australia on Seismic Anisotropy and Mantle Flow. Geochemistry, Geophysics, Geosystems (ISSN: 15252027), 24(9), p.16. https://doi.org/10.1029/2023GC011066

Ezad, I., Shcheka, S., Buhre, S., Buhre, A., Gorojovsky, L., Shea, J., Forster, M *., Foley, S.* (2023). Rapid quench piston cylinder apparatus: An improved design for the recovery of volatile-rich geological glasses from experiments at 0.5-2.5 GPa **. Review of Scientific Instruments (ISSN: 0034-6748), 94(5), p.12. https://doi.org/10.1063/5.0129417

Fallon, S.* (2023). Background Tests and Improvements at LAC-UFF Aiming at Sample Size Reduction in Foraminifera ¹⁴C Measurement. SCOPUS Not Found (ISSN: 12345678), 3(3), p.574-583. https://doi.org/10.3390/geographies3030030

Falster, G.*, Abram, N.* (2023). Globally coherent water cycle response to temperature change during the past two millennia. Nature Geoscience (ISSN: 17520894), 16, p.997–1004. https://doi.org/10.1038/s41561-023-01291-3

Falster, G.*, Konecky, B., Coats, S., Stevenson, S. (2023). Forced changes in the Pacific Walker circulation over the past millennium. Nature (ISSN: 00280836), p.27. https://doi.org/10.1038/s41586-023-06447-0

Fanetti, S., Romi, S., Crichton, A., Rosenthal, A.*, Scelta, D., Alabarse, F., Bini, R., Santoro, M. (2023). Quasi-isotropic high pressure, large volume synthesis of a polymeric composite incorporating diamond-like carbon nano-threads **. Diamond and Related Materials (ISSN: 0925-9635), 136. https://doi.org/10.1016/j.diamond.2023.109912

Fentimen, R., De Deckker, P.*, Depuydt, P., Mojtahid, M. (2023). Deep-sea response to interglacial-glacial variability on the South Australian margin over the last 94 ka. Quaternary Science Reviews (ISSN: 02773791), 320. https://doi.org/10.1016/j.quascirev.2023.108328

Fichtner, A., Hofstede, C., Kennett, B.*, Nymand, N., Lauritzen, M., Zigone, D., Eisen, O. (2023). Fiber-Optic Airplane Seismology on the Northeast Greenland Ice Stream. SCOPUS Not Found (ISSN: 12345678), 3(2), p.125-133. https://doi.org/10.1785/0320230004

Fierro-Arcos, D., Corney, S., Meyer, A., Hayashida, H., Kiss, A.*, Heil, P. (2023). Analysis of ecologically relevant sea ice and ocean variables for the Southern Ocean using a high-resolution model to inform ecosystem studies. Progress in Oceanography (ISSN: 0079-6611), 215, p.1-16. https://doi.org/10.1016/j.pocean.2023.103049

Foley, S., Andronikov, A., Halpin, J., Daczko, N., Jacob, D.* (2023). Mantle rocks in East Antarctica. In: The Geochemistry and Geophysics of the Antarctic Mantle, Geological Society of London, London, United Kingdom, (ISBN:978-1-78620-467-7), 56(1), p.17-32. https://doi.org/10.1144/M56-2020-8

Fordham, B. G. & Welter-Schultes, F. W. (2023). Comment on “Taxonomic review of living planktonic foraminifera” by Brummer and Kučera (2022). Journal of Micropalaeontology, 42: 31–32. https://doi.org/10.5194/jm-42-31-2023

Fourquez, M., Conway, T., Janssen, D., Cabanes, D., Ellwood, M.*, Sieber, M., Trimborn, S., Hassler, C. (2023). Chasing iron bioavailability in the Southern Ocean: Insights from Phaeocystis antarctica and iron speciation. Science Advances (ISSN: 23752548), 9(26), p.1-13. https://doi.org/10.1126/sciadv.adf9696

Fukuyo, N., Clark, G., Yokoyama, Y.* (2023). Reappraisal of lagoon specific local marine reservoir effects in Tongatapu, the Kingdom of Tonga, over the last 3000 years. Nuclear Instruments and Methods in Physics Research: Section B (ISSN: 0168583X), 538, p.185-191. https://doi.org/10.1016/j.nimb.2023.02.027

Gai, C., Roberts, A.*, Heslop, D.*, Rohling, E.*, Wu, J., Shi, Z., Liu, J., Zhong, Y., Liu, Y., Liu, Q. (2023). Heterogenous westerly shifts linked to Atlantic meridional overturning circulation slowdowns **. Communications Earth & Environment (ISSN: 26624435), 4(325). https://doi.org/10.1038/s43247-023-00987-z

Gilbert, N., LeCleir, G., Pound, H., Strzepek, R., Ellwood, M.*, Twining, B., Roux, S., Boyd, P., Wilhelm, S. (2023). Giant Virus Infection Signatures Are Modulated by Euphotic Zone Depth Strata and Iron Regimes of the Subantarctic Southern Ocean. mSystems (ISSN: 2379-5077), 8(2), p.17. https://doi.org/10.1128/msystems.01260-22

Gillett, Z., Taschetto, A., Holgate, C.*, Santoso, A. (2023). Linking ENSO to Synoptic Weather Systems in Eastern Australia. Geophysical Research Letters (ISSN: 00948276), 50(15), p.9. https://doi.org/10.1029/2023GL104814

Gong, L., Holbourn, A., Opdyke, B.*, Zhang, Y., Ravelo, C., Zhang, P., Xu, J., Matsuzaki, K., Aiello, L., Beil, S., Andersen, N. (2023). Middle Pleistocene re-organization of Australian Monsoon **. Nature Communications (ISSN: 20411723), 14(1). https://doi.org/10.1038/s41467-023-37639-x

Grun, R.*, Pares, J., Haddoumi, H., Duval, M., Álvarez-Posada, C., Aouraghe, H., Pla-Pueyo, S., Benito-Calvo, A., Rodríguez-Hidalgo, A., Van der Made, J. (2023). First magnetostratigraphic results in the Aïn Beni Mathar-Guefaït Basin, Northern High Plateaus (Morocco): The Pliocene-Pleistocene Dhar Iroumyane composite section. GEOBIOS (ISSN: 0016-6995), 76, p.18-37. https://doi.org/10.1016/j.geobios.2023.01.004

Grun, R.*, Samanta, M.*, Ellwood, M.* (2023). Variability in zinc:phosphorous and zinc:silicon ratios and zinc isotope fractionation in Southern Ocean diatoms: Observations from laboratory and field experiments. Marine Chemistry (ISSN: 03044203), 257, p.1-14. https://doi.org/10.1016/j.marchem.2023.104330

Grun, R.*, Stringer, C. (2023). Direct dating of human fossils and the ever-changing story of human evolution. Quaternary Science Reviews (ISSN: 02773791), 322. https://doi.org/10.1016/j.quascirev.2023.108379

Hayashida, H., Kiss, A.*, Miyama, T., Miyazawa, Y., Yasunaka, S. (2023). Anomalous Nutricline Drives Marked Biogeochemical Contrasts During the Kuroshio Large Meander. Journal of Geophysical Research: Oceans (ISSN: 2169-9275), 128(7), p.1-17. https://doi.org/10.1029/2023JC019697

Haynes, L., Honisch, B., Holland, K., Eggins, S.*, Rosenthal, Y. (2023). Calibrating Non-Thermal Effects on Planktic Foraminiferal Mg/Ca for Application Across the Cenozoic. Paleoceanography and Paleoclimatology (ISSN: 1944-9186), 38(10). https://doi.org/10.1029/2023PA004613

Heslop, D.*, Amarathunga, U.*, Rohling, E.* (2023). Estimating Plio-Pleistocene North African Monsoon Runoff Into the Mediterranean Sea and Temperature Impacts. Paleoceanography and Paleoclimatology (ISSN: 1944-9186), 38(11). https://doi.org/10.1029/2023PA004677

Heslop, D.*, Scealy, J., Wood, A., Roberts, A.*, Tauxe, L. (2023). A Bootstrap Common Mean Direction Test. Journal of Geophysical Research: Solid Earth (ISSN: 21699313), 128(8). https://doi.org/10.1029/2023JB026983

Hogg, A.*, Holmes, R., Constantinou, N.* (2023). Surface Heating Steers Planetary-Scale Ocean Circulation. Journal of Physical Oceanography (ISSN: 0022-3670), 53(10), p.2375-2391. https://doi.org/10.1175/JPO-D-23-0016.1

Holgate, C.*, Pepler, A., Rudeva, I., Abram, N.* (2023). Anthropogenic warming reduces the likelihood of drought-breaking extreme rainfall events in southeast Australia. Weather and Climate Extremes (ISSN: 2212-0947), 42, p.9. https://doi.org/10.1016/j.wace.2023.100607

Hollyday, A., Austermann, J., Lloyd, A., Hoggard, M.*, Richards, F., Rovere, A. (2023). A Revised Estimate of Early Pliocene Global Mean Sea Level Using Geodynamic Models of the Patagonian Slab Window. Geochemistry, Geophysics, Geosystems (ISSN: 15252027), 24(2). https://doi.org/10.1029/2022GC010648

Hoshino, Y., Nettersheim B., Gold, D., Hallmann, C., Vinnichenko, G.*, van Maldegem, L.*, Bishop, C.*, Brocks, J.*, Gaucher, E. (2023). Genetics re-establish the utility of 2-methylhopanes as cyanobacterial biomarkers before 750 million years ago. Nature Ecology and Evolution (ISSN: 2397334X), 7. https://doi.org/10.1038/s41559-023-02223-5

Hu, J.*, Pham, T.*, Tkalčić, H.* (2023). Seismic moment tensor inversion with theory errors from 2-D Earth structure: implications for the 2009-2017 DPRK nuclear blasts. Geophysical Journal International (ISSN: 0956540X), 235(3), p.2035-2054. https://doi.org/10.1093/gji/ggad348

Huneke, W.* (2023). Dynamic Response to Ice Shelf Basal Meltwater Relevant to Explain Observed Sea Ice Trends Near the Antarctic Continental Shelf. Geophysical Research Letters (ISSN: 00948276), 50(24). https://doi.org/10.1029/2023GL105435

Huneke, W.*, Morrison, A.*, Hogg, A.* (2023). Decoupling of the Surface and Bottom-Intensified Antarctic Slope Current in Regions of Dense Shelf Water Export. Geophysical Research Letters (ISSN: 00948276), 50(16), p.10. https://doi.org/10.1029/2023GL104834

Huston, D.L., D.C. Champion, K. Czarnota, J. Duan, M. Hutchens, S. Paradis, M.J. Hoggard, B. Ware, G.M. Gibson, M.P. Doublier, K. Kelley, A. McCafferty, N. Hayward, F.D. Richards, S. Tessalina & G. Carr (2023).Zinc on the edge – Isotopic and geophysical evidence of cratonic edges control on world-class shale-hosted zinc–lead deposits. Mineralium Deposita, Vol. 58, p.707–729. https://doi.org/10.1007/s00126-022-01153-9

J. Zhang, Z., Dauphas, N., C. Johnson, A., M. Aarons, S., Bennett, V.*, Nutman, A., MacLennan, S., Schoene, B. (2023). Titanium and iron isotopic records of granitoid crust production in diverse Archean cratons. Earth and Planetary Science Letters (ISSN: 0012821X), 620, p.13. https://doi.org/10.1016/j.epsl.2023.118342

Jackson, S.*, Vance, T., Crockart, C., Moy, A., Plummer, C., Abram, N.* (2023). Climatology of the Mount Brown South ice core site in East Antarctica: implications for the interpretation of a water isotope record. Climate of the Past (ISSN: 18149324), 19(8), p.1653-1675. https://doi.org/10.5194/cp-19-1653-2023

Janssen, D., Gilliard, D., Rickli, J., Nasemann, P., Koschinsky, A., Hassler, C., Bowie, A., Ellwood, M.*, Kleint, C., Jaccard, S. (2023). Chromium stable isotope distributions in the southwest Pacific Ocean and constraints on hydrothermal input from the Kermadec Arc. Geochimica et Cosmochimica Acta (ISSN: 00167037), 342, p.31-44. https://doi.org/10.1016/j.gca.2022.12.010

Jarrett, A.*, Hope, J.*, Brocks, J.* (2023). Resource potential of the Proterozoic–Paleozoic Carrara depocentre, South Nicholson region, Australia: Insights from stratigraphic drilling. Organic Geochemistry (ISSN: 0146-6380), 186. https://doi.org/10.1016/j.orggeochem.2023.104688

Jian, Z., Dang, H., Yu, J.*, Wu, Q., Gong, X., Stepanek, C., Colin, C., Hu, L., Lohmann, G., Zhou, X., Wan, S. (2023). Changes in deep Pacific circulation and carbon storage during the Pliocene-Pleistocene transition. Earth and Planetary Science Letters (ISSN: 0012821X), 605, p.1-10. https://doi.org/10.1016/j.epsl.2023.118020

Jiang, C.* (2023). The magmatic origin of the Columbia River Gorge, USA. Science Advances (ISSN: 23752548), 9(51), p.eadj3357. https://doi.org/10.1126/sciadv.adj3357

Jiang, C.*, Schmandt, B., Abers, G., Kiser, E., Miller, M.* (2023). Segmentation and Radial Anisotropy of the Deep Crustal Magmatic System Beneath the Cascades Arc. Geochemistry, Geophysics, Geosystems (ISSN: 15252027), 24(3). https://doi.org/10.1029/2022GC010738

Jin, C., Xu, D., Li, M., Hu, P.*, Jiang, Z., Liu, J., Miao, Y., Wu , F., Liang, W., Zhang, Q., Su, B. (2023). Tectonic and orbital forcing of the South Asian monsoon in central Tibet during the late Oligocene. PNAS - Proceedings of the National Academy of Sciences of the United States of America (ISSN: 00278424), 120(15), p.1-12. https://doi.org/10.1073/pnas.2214558120

Kennett, B.*, Gorbatov, A., Yuan, H., Agrawal, S.*, Murdie, R., Doublier, M., Eakin, C.*, Miller, M.*, Czarnota, K., Zhao, L., O'Donnell, J., Dentith, M., Gessner, K. (2023). Refining the Moho across the Australian continent. Geophysical Journal International (ISSN: 0956540X), 233(3), p.1863-1877. https://doi.org/10.1093/gji/ggad035

Kimbrough, A.*, Gagan, M.*, Dunbar, G., Hantoro, W., Shen, C., Hu, H., Cheng, H., Edwards, L., Rifai, H., Suwargadi, B. (2023). Multi-proxy validation of glacial-interglacial rainfall variations in southwest Sulawesi. Communications Earth & Environment (ISSN: 26624435), 4, p.13. https://doi.org/10.1038/s43247-023-00873-8

Kiss, A.* (2023). Enhanced Southern Ocean CO<inf>2</inf> outgassing as a result of stronger and poleward shifted southern hemispheric westerlies. Biogeosciences (ISSN: 1726-4170), 20(21), p.4413-4431. https://doi.org/10.5194/bg-20-4413-2023

Klocking, M., Wyborn, L., Lehnert, K., Ware, D., Prent, A., Profeta, L., Kohlmann, F., Noble, B., Bruno, I., Lambart, S., Ananuer, H., Gao, Y.* (2023). Community recommendations for geochemical data, services and analytical capabilities in the 21st century. Geochimica et Cosmochimica Acta (ISSN: 00167037), 351, p.192-205. https://doi.org/10.1016/j.gca.2023.04.024

Klootwijk, C.* (2023). Matching mid-to-latest Carboniferous pole path segments for eastern Australia and northern Armorica indicate a late Carboniferous Pangea-B configuration and a mid Carboniferous inertial interchange true polar wander event. Earth-Science Reviews (ISSN: 00128252), 244, p.26. https://doi.org/10.1016/j.earscirev.2023.104521

Kotowski, J., Olszewska-Nejbert, D., Nejbert, K., Forster, M.* (2023). Long-distance transport of clastic material revealed by monazite and muscovite dating: Albian arenites, extra-Carpathian Poland. Sedimentary Geology (ISSN: 00370738), 446. https://doi.org/10.1016/j.sedgeo.2023.106339

Krestianinov, E.*, Amelin, Y.*, Yin, Q., Cary, P., Huyskens, M., Miller, A., Dey, S., Hibiya, Y., Tang, H., Young, E., Pack, A., Di Rocco, T. (2023). Igneous meteorites suggest Aluminium-26 heterogeneity in the early Solar Nebula. Nature Communications (ISSN: 20411723), 14(1), p.11. https://doi.org/10.1038/s41467-023-40026-1

Kumar, R., Switzer, A. D., Gouramanis, C., Bristow, C. S. ., & Brill, D. (2023). A 2500-year sea level record from the Phra Thong Island, Thailand. Coastal Engineering Proceedings 37: sediment.42. . https://doi.org/10.9753/icce.v37.sediment.42

Latour, P., Strzepek, R., Wuttig, K., van der Merwe, P., Eggins, S.*, Bach, L., Boyd, P., Ellwood, M.*, Pinfold, T., Bowie, A. (2023). Seasonality of phytoplankton growth limitation by iron and manganese in subantarctic waters. Elementa: science of the anthropocene (ISSN: 2325-1026), 11(1). https://doi.org/10.1525/elementa.2023.00022

Le Losq, C.*, Sossi, P. (2023). Atomic structure and physical properties of peridotite glasses at 1 bar. Frontiers in Earth Science (ISSN: 22966463), 11. https://doi.org/10.3389/feart.2023.1040750

Leggett, K., Yokoyama, Y.*, Miyairi, Y., Ota , K., Fukuyo, N., Shirahama, Y. (2023). Testing the potential of Serpulidae tubes as an indicator of past relative sea-level collected from shored wave dissipating blocks along the Pacific and Japan sea coast of northeastern Japan. Nuclear Instruments and Methods in Physics Research: Section B (ISSN: 0168583X), 538, p.58-63. https://doi.org/10.1016/j.nimb.2023.02.004

Li, Q., England, M., Hogg, A.*, Rintoul, S., Morrison, A.* (2023). Abyssal ocean overturning slowdown and warming driven by Antarctic meltwater. Nature (ISSN: 00280836), 615, p.841-847. https://doi.org/10.1038/s41586-023-05762-w

Li, Y.*, Ng, K.*, Purcell, M.* (2023). Split, Count, and Share: A Differentially Private Set Intersection Cardinality Estimation Protocol. Conference name not found SCOPUS, , p.1684-1694.

Li, Y.*, Purcell, M., Rakotoarivelo, T., B Smith, D., Ranbaduge, T., Ng, K. (2023). Private Graph Data Release: A Survey **. ACM Computing Surveys (ISSN: 03600300), 55(11). https://doi.org/10.1145/3569085

Li, Y., Li, F., Kershaw, S., Burne, R.*, Wang, X., Lu, C., Liao, J., Li, Y., Wang, Z., Li, Y. (2023). Extensive occurrences of lower Cambrian red beds in South China: Composition, characteristics, and implications for global environmental change. Marine and Petroleum Geology (ISSN: 0264-8172), 157. https://doi.org/10.1016/j.marpetgeo.2023.106475

Liang, X., Forster, M.*, Lister, G. (2023). Lithospheric extension of the accretionary wedge: An example from the Lanling high-pressure metamorphic terrane in Central Qiangtang, Tibet. Geological Society of America Bulletin (ISSN: 0016-7606), 135(7-8), p.1688-1708. https://doi.org/10.1130/B36476.1

Lin, Y., Whitehouse, P., Valentine, A.*, Woodroffe, S. (2023). GEORGIA: A Graph Neural Network Based Emulator for Glacial Isostatic Adjustment **. Geophysical Research Letters (ISSN: 00948276), 50(18). https://doi.org/10.1029/2023GL103672

Lin, Z., Strauss, H., Peckmann, J., Roberts, A.*, Lu, Y., Sun, X., Chen , T., Harzhauser, M. (2023). Seawater sulphate heritage governed early Late Miocene methane consumption in the long-lived Lake Pannon **. Communications Earth & Environment (ISSN: 26624435), 4(1), p.1-11. https://doi.org/10.1038/s43247-023-00879-2

Liu, L., Zhou, T., Fu, B.*, Ireland, T.*, Zhang, D., Liu, G., Yuan, F., Zha, X., White, N. (2023). Multiple fluid sources in skarn systems: Oxygen isotopic evidence from the Haobugao Zn-Fe-Sn deposit in the southern Great Xing'an Range, NE China. American Mineralogist (ISSN: 0003004X), 108(10), p.1957-1972. https://doi.org/10.2138/am-2022-8523

Liu, P., Zheng, Y., Zhang, R., Bai, J., Zhu, K., Benzerara, K., Menguy, N., Zhao, X.*, Roberts, A.*, Pan, Y., Li, J. (2023). Key gene networks that control magnetosome biomineralization in magnetotactic bacteria **. National Science Review (ISSN: 2053-714X), 10(1), p.1-12. https://doi.org/10.1093/nsr/nwac238

Ma, C., Tang, Y., Mitchell, R., Li, Y., Sun, S., Zhu, J., Foley, S.*, Wang, M., Ye, C., Ying, J., Zhu, R. (2023). Volcanic phosphorus supply boosted Mesozoic terrestrial biotas in northern China. Science Bulletin (ISSN: 2095-9273), 68(12), p.1317-1326. https://doi.org/10.1016/j.scib.2023.05.022

Magrini, F.*, Kästle, E., Pilia, S., Rawlinson, N., De Siena, L. (2023). A New Shear-Velocity Model of Continental Australia Based on Multi-Scale Surface-Wave Tomography. Journal of Geophysical Research: Solid Earth (ISSN: 21699313), 128(7). https://doi.org/10.1029/2023JB026688

Magyar, J., Sambridge, M.* (2023). Hydrological objective functions and ensemble averaging with the Wasserstein distance **. Hydrology and Earth System Sciences (ISSN: 1027-5606), 27(5), p.991-1010. https://doi.org/10.5194/hess-27-991-2023

Maher, N.*, Jnglin Wills, R., DiNezio, P., Klavans, J., Milinski, S., Sanchez, S., Stevenson, S., Stuecker, M., Wu, X. (2023). The future of the El Niño-Southern Oscillation: using large ensembles to illuminate time-varying responses and inter-model differences. Earth System Dynamics (ISSN: 2190-4979), 14(2), p.413-431. https://doi.org/10.5194/esd-14-413-2023

Malagon-Santos, V., Slangen, A., Hermans, T., Dangendorf, S., Marcos, M., Maher, N.* (2023). Improving statistical projections of ocean dynamic sea-level change using pattern recognition techniques. Ocean Science (ISSN: 1812-0784), 19(2), p.499-515. https://doi.org/10.5194/os-19-499-2023

Mann, T., Schöne, T., Kench, P., Lambeck, K.*, Ashe, E., Kneer, D., Beetham, E., Illigner, J., Rovere, A., Marfai, M., Westphal, H. (2023). Fossil Java Sea corals record Laurentide ice sheet disappearance**. Geology (ISSN: 00917613), 51(7), p.631-636. https://doi.org/10.1130/G51038.1

Martin, H., Maher, W.*, Snell, P., Philpot, K., Ellwood, M.* (2023). The uptake of arsenic species by commonly grown Australian rice varieties cultivated utilising two widely used agronomic practices (straw incorporation and nitrogen fertilisation) and the role dimethyl arsenic plays in inducing straighthead disease **. Environmental Chemistry (ISSN: 1448-2517), 20(2), p.83-94. https://doi.org/10.1071/EN22055

Martin, S.* (2023). Rupture Scenarios for the 3 June 1770 Haiti Earthquake. Bulletin of the Seismological Society of America (ISSN: 0037-1106), 113(1), p.157-185. https://doi.org/10.1785/0120220108

Martin, S.* (2023). Sediment analysis and historical context of the 2018 Palu-Donggala tsunami deposit, Indonesia. Marine Geology (ISSN: 0025-3227), 466. https://doi.org/10.1016/j.margeo.2023.107159

Marynowski, L., Goryl, M., Lempart-Drozd, M., Bucha, M., Majewski, Brocks, J.*, Simoneit, B. (2023). Differences in hemicellulose composition and pectin detection in Eocene and Miocene xylites. Chemical Geology (ISSN: 00092541), 624. https://doi.org/10.1016/j.chemgeo.2023.121416

Mavrogenes, J.*, Arculus, R.*, Leong, T.* (2023). Water-sulfur-rich, oxidised adakite magmas are likely porphyry copper progenitors. Scientific Reports (ISSN: 20452322), 13(1). https://doi.org/10.1038/s41598-023-31736-z

McGirr, R.*, Tregoning, P.*, Allgeyer, S.*, McQueen, H.*, Purcell, A.* (2023). Interplay of Altitude, Ground Track Coverage, Noise, and Regularization in the Spatial Resolution of GRACE Gravity Field Models. Journal of Geophysical Research: Solid Earth (ISSN: 21699313), 128(1), p.1-16. https://doi.org/10.1029/2022JB024330

McIntyre, S., King, P.*, Mills, F.* (2023). A rocky exoplanet classification method and its application to calculating surface pressure and surface temperature. Monthly Notices of the Royal Astronomical Society (ISSN: 00358711), 519(4), p.6210-6221. https://doi.org/10.1093/mnras/stad095

Miller, M.*, Pickle, R.*, Murdie, R., Allen, T., Yuan, H., Gessner, K., Kennett, B.*, Whitney, J. (2023). Southwest Australia Seismic Network (SWAN): Recording Earthquakes in Australia's Most Active Seismic Zone **. Seismological Research Letters (ISSN: 0895-0695), 94(2 A), p.999-1011. https://doi.org/10.1785/0220220323

Miyairi, Y., Yokoyama, Y.*, Nagata, T. (2023). Newly designed glass apparatus to conduct stepwise dissolution experiment for radiocarbon using fish otoliths **. Nuclear Instruments and Methods in Physics Research: Section B (ISSN: 0168583X), 539, p.22-27. https://doi.org/10.1016/j.nimb.2023.02.031

Moresi, L.* (2023). Literate, Reusable, Geodynamic Modeling **. In: Dynamics of Plate Tectonics and Mantle Convection, Elsevier Inc., Amsterdam, Netherlands, (ISBN:978-0-323-85733-8), p.573-582. https://doi.org/10.1016/B978-0-323-85733-8.00010-X

Morrison, A.*, England, M., Hogg, A.*, Kiss, A.* (2023). Weddell Sea Control of Ocean Temperature Variability on the Western Antarctic Peninsula. Geophysical Research Letters (ISSN: 00948276), 50(15), p.10. https://doi.org/10.1029/2023GL103018

Morrison, A.*, Hogg, A.* (2023). Observing Antarctic Bottom Water in the Southern Ocean. Frontiers in Marine Science (ISSN: 22967745), 10. https://doi.org/10.3389/fmars.2023.1221701

Morrison, A.*, Huneke, W.*, Neme, J., Spence, P., Hogg, A.*, England, M., Griffies, S. (2023). Sensitivity of Antarctic Shelf Waters and Abyssal Overturning to Local Winds. Journal of Climate (ISSN: 0894-8755), 36(18), p.6465-6479. https://doi.org/10.1175/JCLI-D-22-0858.1

Mousavi, S., Hejrani, B., Miller, M. S., Salmon, M. (2023).Hypocenter, Fault Plane, and Rupture Characterization of Australian Earthquakes: Application to the September 2021 5.9 Woods Point Earthquake. Seismological Research Letters 2023; 94 (4): p.1761–1774. https://doi.org/10.1785/0220220348

Muston, J.*, Forster, M.*, Vasegh, D.*, Alderton, C., Crispin, S., Lister, G. (2023). Direct dating of overprinting fluid systems in the Martabe epithermal gold deposit using highly retentive alunite. Geochronology (ISSN: 26283697), 5(1), p.153-179. https://doi.org/10.5194/gchron-5-153-2023

Nakanishi, R., Ashi, J., Miyairi, Y., Yokoyama, Y.* (2023). Relationship between depositional environments and preservabilities of Holocene tsunami deposits on the Hidaka coast, Hokkaido, Japan. Quaternary Science Advances (ISSN: 2666-0334), 10. https://doi.org/10.1016/j.qsa.2023.100081

Nutman, A., Bennett, V.*, Green, D., Friend, C. (2023). Evolution of the Palaeozoic mafic-ultramafic Lizard Complex (SW England) from zircon and baddeleyite U-Pb-Hf isotopic constraints: New thoughts on the convergence of Avalonia and Armorica. Lithos (ISSN: 0024-4937), 452-453. https://doi.org/10.1016/j.lithos.2023.107227

O'Donnell, J., Agrawal, S.*, Eakin, C.*, Thiel, S., Brand, K., Gorbatov, A., Goleby, B. (2023). Mapping crustal structure across southern Australia using seismic ambient noise tomography. Gondwana Research (ISSN: 1342937X), 121, p.307-324. https://doi.org/10.1016/j.gr.2023.04.013

Olierook, H., Fougerouse, D., Doucet, L., Liu, Y., Rayner, M., Danišík, M., Condon, D., McInnes, B., Jaques, L.*, Evans, N., McDonald, B. (2023). Emplacement of the Argyle diamond deposit into an ancient rift zone triggered by supercontinent breakup. Nature Communications (ISSN: 20411723), 14. https://doi.org/10.1038/s41467-023-40904-8

O'Neill, H.* (2023). The miscibility gap between the rock salt and wurtzite phases in the MgO-ZnO binary system to 3.5ĝ€¯GPa. European Journal of Mineralogy (ISSN: 0935-1221), 35(6), p.1051-1071. https://doi.org/10.5194/ejm-35-1051-2023

Opdyke, B.* (2023). Evidence of the evolution of the East Antarctic Ice Sheet on the continental slope and rise sedimentary record: Insights from the Sabrina Coast, East Antarctica. Geological Society of America Bulletin (ISSN: 0016-7606), 135(11-12), p.2868-2879. https://doi.org/10.1130/B36674.1

Oppo, D., Lu, W., Huang, K., Umling, N., Guo, W., Yu, J.*, Curry, W., Marchitto, T., Wang, S. (2023). Deglacial Temperature and Carbonate Saturation State Variability in the Tropical Atlantic at Antarctic Intermediate Water Depths. Paleoceanography and Paleoclimatology (ISSN: 1944-9186), 38(9), p.21. https://doi.org/10.1029/2023PA004674

Ota , K., Yokoyama, Y.*, Miyairi, Y., Yamamoto, S., Wang, Y., Miyajima, T. (2023). Monthly measurements of water dissolved inorganic radiocarbon in Lake Kawaguchi for three years indicating seasonal precipitation-groundwater variations **. Nuclear Instruments and Methods in Physics Research: Section B (ISSN: 0168583X), 538, p.75-80. https://doi.org/10.1016/j.nimb.2023.02.021

Otter, L.*, Eder, K., Kilburn, M., Yang, L., O'Reilly, P., Nowak, D., Cairney, J., Jacob, D.* (2023). Growth dynamics and amorphous-to-crystalline phase transformation in natural nacre **. Nature Communications (ISSN: 20411723), 14, p.1-11. https://doi.org/10.1038/s41467-023-37814-0

Paine, E., Boyd, P., Strzepek, R., Ellwood, M.*, Brewer, E., Diaz-Pulido, G., Schmid, M., Hurd, C. (2023). Iron limitation of kelp growth may prevent ocean afforestation. Communications Biology (ISSN: 23993642), 6(1), p.1-9. https://doi.org/10.1038/s42003-023-04962-4

Pascal, P., Nomaki, H., Miyairi, Y., Yokoyama, Y.* (2023). The use of radiocarbon to evaluate the trophic role of geothermal bacteria in shallow hydrothermal water ecosystem. Ecological Indicators (ISSN: 1470160X), 148. https://doi.org/10.1016/j.ecolind.2023.110108

Pham, T.*, Tkalčić, H.* (2023). Up-to-fivefold reverberating waves through the Earth's center and distinctly anisotropic innermost inner core. Nature Communications (ISSN: 20411723), 14(1). https://doi.org/10.1038/s41467-023-36074-2

Piedrahita, V.*, Zhao, X.*, Roberts, A.*, Rohling, E.*, Heslop, D.*, Galeotti, S., Rodriguez Sanz, L.*, Florindo, F., Grant, K.* (2023). Accelerated light carbon sequestration following late Paleocene-early Eocene carbon cycle perturbations. Earth and Planetary Science Letters (ISSN: 0012821X), 604, p.1-14. https://doi.org/10.1016/j.epsl.2023.117992

Pilia, S., Hall, R., Bacon, C., Gilligan, A., Greenfield, T., Tongkul, F., Kramer, S., Wilson, C., Ghelichkhan, S.*, Cornwell, D., Colli, L., Rawlinson, N. (2023). Post-subduction tectonics induced by extension from a lithospheric drip. Nature Geoscience (ISSN: 17520894), 16, p.646–652. https://doi.org/10.1038/s41561-023-01201-7

Ratnayake, A., Wijewardhana, T., Haraguchi, T., Goto, K., Ratnayake, N., Tetsuka, H., Yokoyama, Y.*, Miyairi, Y., Attanayake, A. (2023). Sedimentological observations and geochemical characteristics of paleo-tsunami deposits along the east coast of Sri Lanka in the Indian Ocean. Quaternary International (ISSN: 10406182), 661, p.49-59. https://doi.org/10.1016/j.quaint.2023.02.015

Ray Wang, Z., Stotz, I., Bunge, H., Vilacis, B., Hayek, J., Ghelichkhan, S.*, Lebedev, S. (2023). Cenozoic upper mantle flow history of the Atlantic realm based on Couette/Poiseuille models: Towards paleo-mantle-flowgraphy. Physics of the Earth and Planetary Interiors (ISSN: 0031-9201), 340. https://doi.org/10.1016/j.pepi.2023.107045

Renggli, C., King, P.*, Henley, R., Norman, M.* (2023). Corrigendum to “Volcanic gas composition, metal dispersion and deposition during explosive volcanic eruptions on the Moon” [Geochim. Cosmochim. Acta 206 (2017) 296–311]. Geochimica et Cosmochimica Acta (ISSN: 00167037), 352, p.236-239. https://doi.org/10.1016/j.gca.2017.03.012

Richards, F., Hoggard, M.*, Ghelichkhan, S.*, Koelemeijer, P., Lau, H. (2023). Geodynamic, geodetic, and seismic constraints favour deflated and dense-cored LLVPs. Earth and Planetary Science Letters (ISSN: 0012821X), 602(602), p.1-13. https://doi.org/10.1016/j.epsl.2022.117964

Richards, F.D., S.L. Coulson, M.J. Hoggard, J. Austermann, B. Dyer & J.X. Mitrovica (2023). Geodynamically corrected Pliocene shoreline elevations in Australia consistent with midrange projections of Antarctic ice loss. Science Advances (ISSN: 23752548), 9(46), p.eadg3035. https://doi.org/10.1126/sciadv.adg3035

Roderick, M.*, Shakespeare, C.* (2023). Evaluation of a wind tunnel designed to investigate the response of evaporation to changes in the incoming long-wave radiation at a water surface. Atmospheric Measurement Techniques (ISSN: 1867-1381), 16(20), p.4833-4859. https://doi.org/10.5194/amt-16-4833-2023

Rogers, A., Nebel, O., Nebel-Yacobsen, Y., Wang, X., Arculus, R.*, Miller, L*., Smith, I., Mather, B., Kendrick, M., O'Neill, H.* (2023). The isotopic origin of Lord Howe Island reveals secondary mantle plume twinning in the Tasman Sea. Chemical Geology (ISSN: 00092541), 622. https://doi.org/10.1016/j.chemgeo.2023.121374

Rohling, E.* (2023). Marine methods for carbon dioxide removal: fundamentals and myth-busting for the wider community. Oxford Open Climate Change (ISSN: 2634-4068), 3(1), p.1-17. https://doi.org/10.1093/oxfclm/kgad004

Rossel, P., M. Gianni, G., Reinoso, V., Fanning, M.*, Ducea, M., Muñoz, T., Salvat, D. (2023). Origin of Late Triassic Granitoids of the Coastal Cordillera of Southern Central Chile (34°–37°S): Multi-Isotopic Evidence of Slab Tearing Effects on Pre-Andean Magmagenesis. Tectonics (ISSN: 02787407), 42(2). https://doi.org/10.1029/2022TC007354

Rossignol, C., Rego, E., Philippot, P., Narduzzi, F., Teixeira, L., Silva, M., Nunes Avila, J.*, Lana, C., Trindade, R. (2023). Neoarchean environments associated with the emplacement of a large igneous province: Insights from the Carajás Basin, Amazonia Craton. Journal of South American Earth Sciences (ISSN: 08959811), 130. https://doi.org/10.1016/j.jsames.2023.104574

Ry, R., Cummins, P.*, Hejrani, B., Widiyantoro, S. (2023). 3-D shallow shear velocity structure of the Jakarta Basin from transdimensional ambient noise tomography. Geophysical Journal International (ISSN: 0956540X), 234(3), p.1916-1932. https://doi.org/10.1093/gji/ggad176

Sadatzki, H., Opdyke, B.*, Menviel, L., Leventer, A., Hope, J.*, Brocks, J.*, Fallon, S.*, Post, A., O'Brien, P.*, Grant, K.*, Armand, L.* (2023). Early sea ice decline off East Antarctica at the last glacial-interglacial climate transition**. Science Advances (ISSN: 23752548), 9(41), p.1-16. https://doi.org/10.1126/sciadv.adh9513

Sambridge, M.* (2023). Optimal Transport and Seismic Rays. SCOPUS Not Found (ISSN: 12345678), 11(22). https://doi.org/10.3390/math11224686

Schmidt, C., Morrison, A.*, England, M. (2023). Wind- and Sea-Ice- Driven Interannual Variability of Antarctic Bottom Water Formation. Journal of Geophysical Research: Oceans (ISSN: 2169-9275), 128(6), p.1-18. https://doi.org/10.1029/2023JC019774

Sebastian, N.*, Tkalčić, H.*, Sippl, C.*, Kim, S.*, Reading, A., Chen, Y., Fontaine, F. (2023). The crust-mantle transition beneath Northeast China from P–wave receiver functions. Frontiers in Earth Science (ISSN: 22966463), 11. https://doi.org/10.3389/feart.2023.1144819

Shakespeare, C.* (2023). Eddy Acceleration and Decay Driven by Internal Tides. Journal of Physical Oceanography (ISSN: 0022-3670), 53(12), p.2787-2796. https://doi.org/10.1175/JPO-D-23-0127.1

Shakespeare, C.*, Gibson, A.* (2023). Oceanic eddies induce a rapid formation of an internal wave continuum. SCOPUS Not Found (ISSN: 12345678), 4(1). https://doi.org/10.1038/s43247-023-01137-1

Smith, T., Arora, M., Austin, C., Avila, J., Duval, M., Lim, T., Piper, P., Vaiglova, P., de Vos, J., Williams, I.*, Zhao, J., Green, D. (2023). Oxygen isotopes in orangutan teeth reveal recent and ancient climate variation [IN PRESS] **. eLife (ISSN: 2050084X)(12:RP90217). https://doi.org/10.7554/eLife.90217.2

Sudholz, Z.*, Jaques, L.*, Yaxley, G.*, Taylor, W., Czarnota, K., Haynes, M., Frewer, L., Ramsay, R., Downes, P., Cooper, S. (2023). Mapping the Structure and Metasomatic Enrichment of the Lithospheric Mantle Beneath the Kimberley Craton, Western Australia. Geochemistry, Geophysics, Geosystems (ISSN: 15252027), 24(9). https://doi.org/10.1029/2023GC011040

Sudholz, Z.*, Reddicliffe, T., Jaques, L.*, Yaxley, G.*, Haynes, M., Gorbatov, A., Czarnota, K., Frigo, C.*, Maas, R., Knowles, B.* (2023). Petrology, Age, and Rift Origin of Ultramafic Lamprophyres (Aillikites) at Mount Webb, a New Alkaline Province in Central Australia. Geochemistry, Geophysics, Geosystems (ISSN: 15252027), 24(10). https://doi.org/10.1029/2023GC011120

Tam, E., Yokoyama, Y.*, Miyashita, Y., Miyairi, Y., Milne, G., Lloyd, S. (2023). Age offsets between radiocarbon samples and changes in Holocene depositional ocean environments captured in sediment cores near Ube City, Yamaguchi Prefecture, Japan. Nuclear Instruments and Methods in Physics Research: Section B (ISSN: 0168583X), 540, p.67-73. https://doi.org/10.1016/j.nimb.2023.03.022

Tatnell, L., Anenburg, M.* (2023). Tracing Pb from Nolans Bore thorianite through Alice Springs thorite to radiogenic galena: EPMA and LA-ICP-MS study of time and space. Journal of the Geological Society (ISSN: 00167649), 180(1). https://doi.org/10.1144/jgs2021-132

Tatnell, L., Anenburg, M.*, Loucks, R. (2023). Porphyry Copper Deposit Formation: Identifying Garnet and Amphibole Fractionation With REE Pattern Curvature Modeling. Geophysical Research Letters (ISSN: 00948276), 50(14), p.10. https://doi.org/10.1029/2023GL103525

Timmerman, S.*, Stachel, T., Koornneef, J., Smit, K., Harlou, R., Nowell, G., Thomson, A., Kohn, S., Davies, J., Davies, G., Krebs, M., Burnham, A.* (2023). Sublithospheric diamond ages and the supercontinent cycle. Nature (ISSN: 14764687), 623. https://doi.org/10.1038/s41586-023-06662-9

Tkalčić, H.*, Costa de Lima, T.*, Pham, T.*, Tanaka, S. (2023). Inner core anisotropy from antipodal PKIKP traveltimes. Core-Mantle Co-Evolution: An Interdisciplinary Approach, Wiley - V C H Verlag GmbbH & Co., Germnay,(ISBN:9781119526902), p.165-189. https://doi.org/10.1002/9781119526919.ch10

Treble, P., Priestley, S., Griffiths, A., Baker, A., Abram, N.*, Meredith, K. (2023). Caves demonstrate decrease in rainfall recharge of southwest Australian groundwater is unprecedented for the last 800 years. Communications Earth & Environment (ISSN: 26624435), 4(1), p.1-12. https://doi.org/10.1038/s43247-023-00858-7

Tsuneoka, R., Yokoyama, Y.*, Sakashita, W., Ota , K., Miyairi, Y., Reisuke, K., Yokochi, M. (2023). Radiocarbon dating of wetland sediment from the Konsen Plateau, eastern Hokkaido, Japan. Nuclear Instruments and Methods in Physics Research: Section B (ISSN: 0168583X), 536, p.67-71. https://doi.org/10.1016/j.nimb.2022.12.021

Tu, Z., Yang, Y., Roderick, M.*, McVicar, T. (2023). Potential Evaporation and the Complementary Relationship **. Water Resources Research (ISSN: 00431397), 59(3). https://doi.org/10.1029/2022WR033763

Ulumuddin, Y., Sugoro, I., Beavis, S., Roderick, M.*, Eggins, S.*, Rizky Muarif , M. (2023). Characterisation of Methane Production Pathways in Sediment of Overwashed Mangrove Forests. Forests (ISSN: 19994907), 14(3). https://doi.org/10.3390/f14030564

Vandenburg, E., Nebel, O., Cawood, P., Hugh Smithies, R., Capitanio, F., Miller, L.*, Millet, M., Bruand, E., Moyen, J., Wang, X., Raveggi, M., Jacobsen, Y. (2023). The stability of cratons is controlled by lithospheric thickness, as evidenced by Rb-Sr overprint ages in granitoids **. Earth and Planetary Science Letters (ISSN: 0012821X), 621. https://doi.org/10.1016/j.epsl.2023.118401

Wang, D., Roberts, A.*, Rohling, E.*, Yao, W., Zhong, Y., Yao, Z., Lu, Y., Liu, Q. (2023). Equatorial Pacific dust fertilization and source weathering influences on Eocene to Miocene global CO2 decline. Communications Earth & Environment (ISSN: 26624435), 4, p.1-9. https://doi.org/10.1038/s43247-023-00702-y

Wang, J., Di, Y.*, Asael, D., Planavsky, N., Tarhan, L. (2023). An investigation of factors affecting high-precision Sr isotope analyses (⁸⁷Sr/⁸⁶Sr and δ^{88/86}Sr) by MC-ICP-MS. Chemical Geology (ISSN: 00092541), 621. https://doi.org/10.1016/j.chemgeo.2023.121365

Wang, S.*, Tkalčić, H.* (2023). On the Formation of Global Inter-Source Correlations and Applications to Constrain the Interiors of the Earth and Other Terrestrial Planets. Journal of Geophysical Research: Solid Earth (ISSN: 21699313), 128(8). https://doi.org/10.1029/2023JB027236

Waszek, L., Irving, J., Pham, T.*, Tkalčić, H.* (2023). Seismic insights into Earth's core. Nature Conservation (ISSN: 1314-3301), 14. https://doi.org/10.1038/s41467-023-41725-5

Wehner, D., Rawlinson, N. Greenfield, T., Daryano, D., *Miller, M.S., Supendi, P., Lü, C., & Widiyantoro, S. (2023). SASSIER22: Full-waveform tomography of the eastern Indonesian region that includes surface topography and the fluid ocean. Geochemistry, Geophysics, Geosystems, 23, e2022GC010563. https://doi.org/10.1029/2022GC010563

Wilgus, J., Schmandt, B., Maguire, R., Jiang, C.*, Chaput, J. (2023). Shear Velocity Evidence of Upper Crustal Magma Storage Beneath Valles Caldera. Geophysical Research Letters (ISSN: 00948276), 50(5). https://doi.org/10.1029/2022GL101520

Wood, R., King, F., Chen, Q., Schneider, L.*, Dotte-Sarout, E., Fallon, S.*, Fryirs, K., Gillespie, R., Blong, R. (2023). The size inherited age effect on radiocarbon dates of alluvial deposits: redating charcoal fragments in a sand-bed stream, Macdonald River, NSW, Australia [IN PRESS] **. Radiocarbon (ISSN: 0033-8222), p.1-14. https://doi.org/10.1017/RDC.2023.75

Wuestefeld, A. ... *Lai, V.H., *Miller, M.S. et al. (48 co-authors) (2023). The Global DAS Campaign of February 2023. Seismological Research Letters. https://doi.org/10.1785/0220230180

Yang, H.*, Moresi, L.*, Weng, H., Giordani, J. (2023). Numerical Modeling of Earthquake Cycles Based On Navier-Stokes Equations With Viscoelastic-Plasticity Rheology**. Geochemistry, Geophysics, Geosystems (ISSN: 15252027), 24(9). https://doi.org/10.1029/2023GC010872

Yang, X., Luo, Y., Jiang, C.*, Yang, Y., Niu, F., Li, G. (2023). Crustal and Upper Mantle Velocity Structure of SE Tibet From Joint Inversion of Rayleigh Wave Phase Velocity and Teleseismic Body Wave Data. Journal of Geophysical Research: Solid Earth (ISSN: 21699313), 128(7). https://doi.org/10.1029/2022JB026162

Yang, Y., Roderick, M.*, Guo, H., Miralles, D., Zhang, L., Fatichi, S., Luo, X., Zhang, Y., McVicar, T., Tu, Z., Keenan, T., Fisher, J. (2023). Evapotranspiration on a greening Earth**. Nature Reviews Earth & Environment (ISSN: 2662-138X). https://doi.org/10.1038/s43017-023-00464-3

Yap, W., Switzer, A., Gouramanis, C.*, Horton, B., Marzinelli, E., Wijaya , W., Yan, Y., Dominey-Howes, D., Labbate, M., Jankaew, K., Lauro, F. (2023). Investigating geological records of tsunamis in Western Thailand with environmental DNA. Marine Geology (ISSN: 0025-3227), 457, p.1-13. https://doi.org/10.1016/j.margeo.2023.106989

Yokoyama, Y.*, Nakamura, A., Gen, N., Maemoku, H., Miyairi, Y., Obrochta, S., Matsuzaki, H. (2023). An initial attempt to date Pleistocene marine terraces in the south coast of Japan using in situ cosmogenic 10Be and 26Al. Nuclear Instruments and Methods in Physics Research: Section B (ISSN: 0168583X), 535, p.255-260. https://doi.org/10.1016/j.nimb.2022.11.028

Yu, J.*, Anderson, R., Ji, X.*, Jin, Z., Thornalley, D., Wu, L., Thouveny, N., Cai, Y., Tan, L., Zhang, F., Menviel, L., Tian, J., Xie, X., Rohling, E.*, McManus, J. (2023). Millennial atmospheric CO2 changes linked to ocean ventilation modes over past 150,000 years**. Nature Geoscience (ISSN: 17520894), 16. https://doi.org/10.1038/s41561-023-01297-x

Yuan, S., Li, H., Arculus, R.*, Chen, Y., Ke, S., Sun, W. (2023). Heavy magnesium isotopic compositions of basalts erupted during arc inception: Implications for the mantle source underlying the nascent Izu-Bonin-Mariana arc. Geochimica et Cosmochimica Acta (ISSN: 00167037), 352, p.14-23. https://doi.org/10.1016/j.gca.2023.04.017

Zhang, R.R., P.Y. Liu, Y.Q. Wang, A.P. Roberts*, J.L. Bai, Y. Liu, K.L. Zhu, Z.J. Du, G.J. Chen, Y.X. Pan & J.H. Li (2023). Phylogenetics and biomineralization of a novel magnetotactic Gammaproteobacterium from a freshwater lake in Beijing, China. FEMS Microbiology Ecology (ISSN: 1574-6941), 99(12). https://doi.org/10.1093/femsec/fiad150

Peer Reviewed Publications

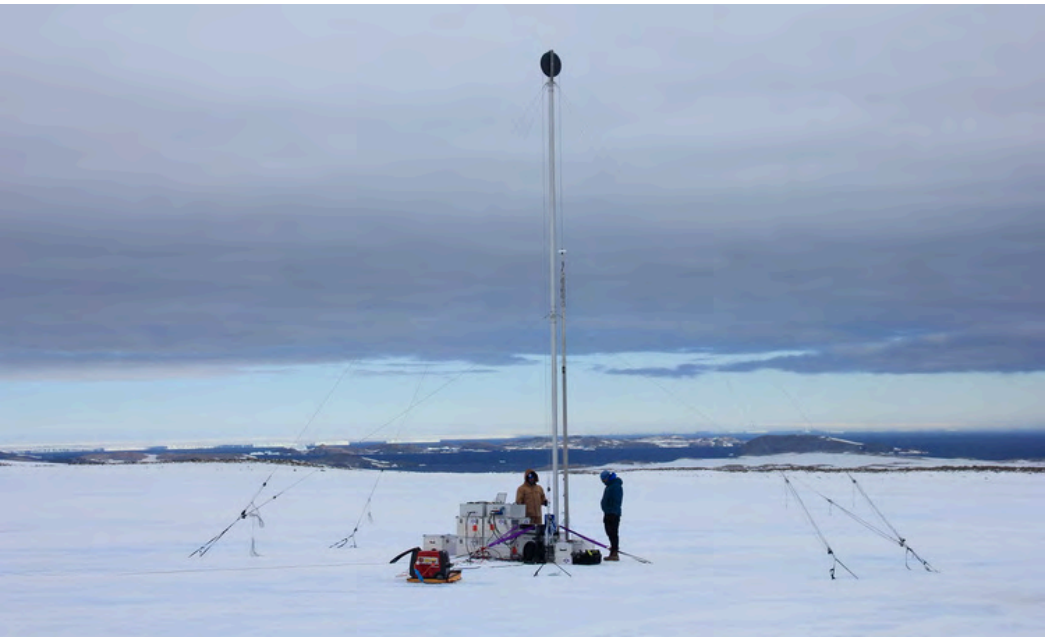
Zhang, Q., Buckman, S., Mitchell, R., Nutman, A., Li, X., Bennett, V.*, Beer, C. (2023). Cross-Orogen Granite Migration as an Indicator of Slab Rollback Along Eastern Gondwana. Geochemistry, Geophysics, Geosystems (ISSN: 15252027), 24(6). https://doi.org/10.1029/2023GC010895

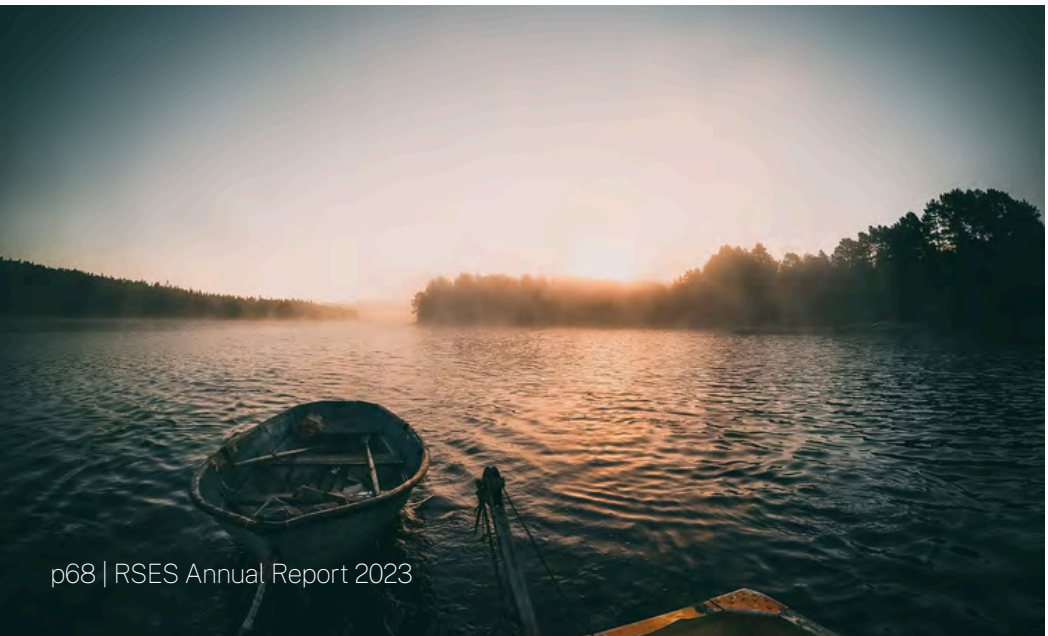
Zhang, T., Keller, C., Hoggard, M.*, D. Rooney, A., Halverson, G., D. Bergmann, K., L. Crowley, J., V. Strauss, J. (2023). A Bayesian framework for subsidence modeling in sedimentary basins: A case study of the Tonian Akademikerbreen Group of Svalbard, Norway. Earth and Planetary Science Letters (ISSN: 0012821X), 620, p.13. https://doi.org/10.1016/j.epsl.2023.118317

Zhao, S.*, McClusky, S.*, Cummins, P.*, Miller, M.*, Nugroho, N.* (2023). New Insights Into Crustal Deformation of the Indonesia–Australia–New Guinea Collision Zone From a Broad-Scale Kinematic Model. Journal of Geophysical Research: Solid Earth (ISSN: 21699313), 128(2). https://doi.org/10.1029/2022JB024810

Zhu, Z.*, Campbell, I.*, Allen, C., Li, Z.* (2023). Evolution of the preserved European continental crust, constrained by U-Pb, O and Hf isotopic analyses of river detrital zircons. Geochimica et Cosmochimica Acta (ISSN: 00167037), 346, p.133-148. https://doi.org/10.1016/j.gca.2023.02.005

Credit: Nerilie Abram (top left) , Polina Sholeninova (lower left), Christina Loidolt (right)







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OTHER GRANTS

Major Equipment Committee Grant

Profs Penny King (RSES), Valeska Ting (CECC) and Dr. Ana Casas Ramos (RSES) were successful in their 23MEC22 application, with the grant: New facility to test gas and liquid interactions with solids. The funding of this 23MEC22 grant ($167,700) was allocated to purchase and install the “3Flex Analyser form ATA Scientific”, a new chemisorption analyser to characterise how specific gases and liquids interact with porous materials. This equipment will bring a new capability to the ANU, boost cross College research and seed new funds.

The equipment will improve ANU’s success in engineering new solids to store fuels (e.g., hydrogen) and greenhouse gases (e.g., carbon dioxide), developing new catalysts for environmental remediation, predicting volcanic hazards, and targeting critical mineral deposits on Earth and in space. This facility will boost research into greenhouse gas sequestration, environmental science, critical minerals, and space, as well as helping Australia reach its Net Zero goals.

Seismological Society of America Travel Grant

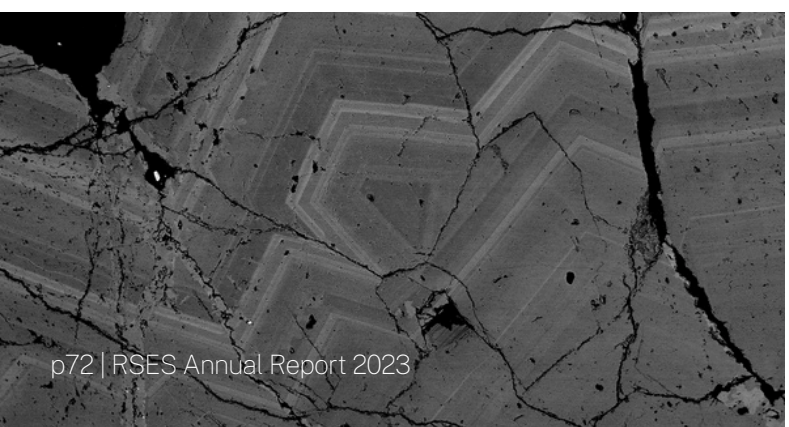
- Dr. Voon Hui Lai

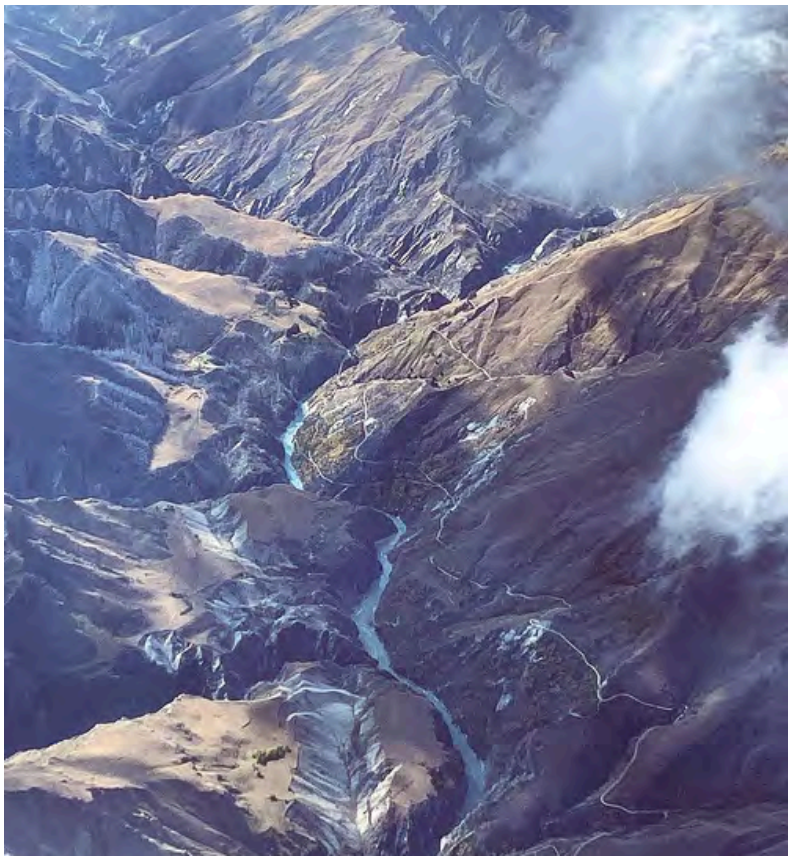
ANU Early Career Researcher Travel Grant

- Dr. Yuhao Dai
- Dr. Voon Hui Lai
- Dr. Tom Merry
- Dr. Sheng Wang
- Dr. Zhi Wei
- Dr. Ping Zhang

Credit: Voon Hui Lai (top left) ,Christina Loidolt (lower left), Voon Hui Lai (right)







RSES 50th Anniversary

July 1st 2023 marked 50 years since the foundation of the Research School of Earth Sciences at ANU when, in 1973 with Anton L. Hales as its first director, the Department of Geophysics and Geochemistry became the new Research School of Earth Sciences.

The anniversary was celebrated over several days in November, beginning with a Big Morning Tea reunion session. We were delighted to welcome over 200 former and current staff and students, creating an atmosphere buzzing with stories and reminiscences and surrounded by posters, photographs, and memorabilia from past decades. It was great to see familiar faces and meet new friends who share the passion for Earth Sciences and take them on tours of our facilities to see the work now being done.

This was followed by a series of seminars in the new Physics auditorium showcasing the research now under way in the School. Separate research sessions were grouped under Geochemistry, Geophysics, and Climate and Ocean Geoscience. Each session concluded with a panel discussion, where the speakers shared their insights and discussed future directions in the field.

The Geochemistry Symposium was convened by Dr. Antony Burnham. The symposium featured invited Speaker, Dr. Carla Tiraboschi from the University of Münster, speaking on "Fluids in the Upper Mantle: an Experimental Perspective on Volatiles, Element Transfer, and Metasomatism". This was followed by Professor Andrew Berry on "Critical Metals for the Green Energy Transition", Professor Penny King on "Adventures from the Deep Earth to the Critical Zone" and Professor Jochen Brocks on the "Lost World of Complex Life and the Late Rise of our Nucleated Ancestors", and a panel discussion chaired by Associate Professor Olivier Alard.

The Geophysics Symposium was convened by Dr. Chengxin Jiang and featured invited speaker, Dr. Grace Shephard presenting "A Magical Mystery Tour of Arctic Geodynamics". This was followed by Professor Rhodri Davies on "Linking the Evolution of Earth's Surface to Dynamical Processes within its Interior", Professor Meghan Miller on "Photonic Seismology - Lighting up Dark Fiber for the Next Generation of Seismic Imaging", and Professor Hrvoje Tkalčić on "Echoes from the Planetary Interiors - Seismic Insights into Deep Worlds", and a panel discussion chaired by Dr. Caroline Eakin.

The Climate and Ocean Geoscience Symposium was convened by Dr. Georgy Falster and featured invited speaker Dr. Felicity McCormack from Monash University on "What Have We Learned From 50(+) Years of Antarctic and Southern Ocean Research?". This was followed by Dr. Callum Shakespeare on "Ocean and Ice", Dr. Nicola Maher on "Climate and Ocean Geoscience at RSES: an Overview, Geodesy, and Climate", Professor Stewart Fallon on "Chemistry and Marine Environments", and a panel discussion chaired by Dr. Adele Morrison.

A highlight of the second day was the sesqui-annual Jaeger-Hales Lecture, a tradition started in the early days of RSES. Prof. Maureen E. Raymo of Columbia University delivered a lecture on "Sea Level, Climate, and Tectonics: A Multidisciplinary Earth Story" and later engaged with students, and early career researchers. The day was capped with a Gala Dinner at the National Museum of Australia, featuring a "50 Year Voyage" presentation by Invited Speaker Dr. Shane Huntington, a Melbourne based physicist and science broadcaster.

The third day began with an Alumni Symposium, an opportunity to showcase the varied pathways taken in the careers of some of our graduates. Convened by Professor Louis Moresi. We heard from Dr. Helen Degeling from Cobalt Blue Holdings, Dr. Dave Osmond from Windlab, Dr. Stephanie Downes from Deloitte, and Dr. James Johnson, CEO of Geoscience Australia. A highlight of the morning was the sweet surprise of a 50th anniversary chocolate birthday cake.

In the afternoon, after school and reunion photos were taken, the "Directors Stories" session, convened by Professor Ian Williams, provided our former directors an opportunity to reflect on the past and future directions of the School. Speakers included Emeritus Professors Ian Jackson, Brian Kennett, Mark Harrison (via livestream from the US), David Green (from Tasmania), and Kurt Lambeck.

Finally, Director Dorrit Jacob, led a toast to the future of the School marking the end of the 50th Anniversary celebration reflecting on 50 years of excellence at RSES. The 50th Anniversary Committee would like to thank everyone who attended or contributed for being a part of this historic milestone.



Above: RSES 50th Anniversary guest speakers from top left to lower right: Professor Maureen Raymo, Dr. Grace Shephard, Dr. James Johnson, Dr. Felicity McCormack, Dr. Dave Osmond, Dr. Helen Degeling, Dr. Stephanie Downes, Dr. Carla Tiraboschi and Dr. Shane Huntington













Credit: Richard Arculus (all above)

STUDENT NEWS

Fieldtrips

Snowy Mts Fieldtrip

First-year students in EMSC1006 went on a field trip to Kosciuszko National Park. On Saturday, they walked up to Blue Lake noting how the climate, ecology, and geology have interacted to shape the surrounding landscape. On Sunday, they travelled to Guthega Dam. They also heard from Professor Adrienne Nicotra about climate, ecology, and the Australian Mountain Research Facility, of which RSES is a part.





Sth Coast Earth

66 first-year students from EMSC1008 (EARTH) explored the geology of the Sydney Basin and Lachlan Fold Belt along the NSW South Coast. Throughout the week the students learned key skills such as how to make a cross-section, geological map, and stratigraphic column, as well as keeping a record of their observations and geological interpretations in their notebooks.

Cooma Field Trip

Antony Burnham led a group of students on the Magmatism and Metamorphism field trip to Cooma.



Planetary Science

43 students attended the EMSC3022 Planetary Science Canberra Fieldtrip in less windy conditions than last year led by Penny King and Olivier Alard. The fieldtrip included visits to State Circle, Deakin anticline, Yarralumula Creek regolith, the Canberra Deep Space Communications Center, Gossan Hill and Lake George.



Wee Jasper Field Trip

Geology spent a week in April mapping the folded sediments at Taemas, near Wee Jasper. A fun time was had by all, and special thanks goes to the team of staff including Brad Opdyke, Greg Yaxley, Zach Sudholz, Ping Zhang, Buse Turunctur, Caleb Bishop and Oliver Medd



Understanding Geological Hazards



Seventeen ANU students embarked on an enriching mid-semester break adventure in Japan. The "Understanding Geological Hazards" course, run in collaboration with the University of Tokyo, delved deep into the realm of geological phenomena and disaster management.

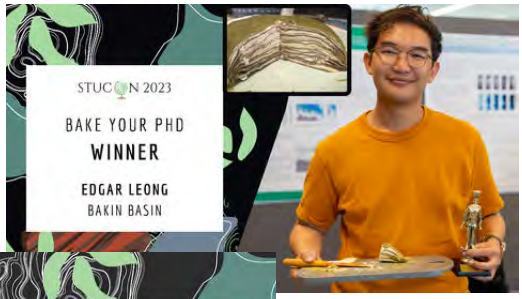
Stucon Winners

Bake Your PhD
1st: Edgar Leong
2nd: Timothy Leong

Bake Your PhD (People's choice)
Ruby Turner

Posters (People's choice)
1st: Polina Sholeninova
2nd: Jinyin Hu

Unearth Your Science (People's choice)
1st: Catherine Wilsbacher
2nd: Rachel Kirby







2023 Photo Comp Winners

As in 2022, many of images displayed in this annual report are sources from our photo competition entries! The winning entries for 2023 were:

- RSES on Holidays: Navid Constantinou & Polina Sholeninova
- RSES in the field: Polina Sholeninova
- RSES in the lab: Kial Stewart
- RSES in the office: Polina Sholeninova

GEOBALL 2023









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