

CLIMATE CHANGE RESEARCH CENTRE
ANNUAL REPORT

2023



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UNSW
Climate Change
Research Centre

OUR MISSION

CCRC HOUSES RESEARCH EXPERTISE IN THE KEY AREAS OF EARTH'S CLIMATE: ATMOSPHERIC, OCEANIC AND TERRESTRIAL PROCESSES. WE APPLY BASIC SCIENTIFIC PRINCIPLES TO PRESSING QUESTIONS ON CLIMATE DYNAMICS, GLOBAL CLIMATE CHANGE, AND EXTREMES OF WEATHER AND CLIMATE.

RESEARCH

- A new emulator using Machine Learning to downscale climate model outputs at negligible cost. 10.1029/2022EF003291
- Stratospheric clouds enhanced polar warming significantly during past warm climates. 10.1038/s41561-023-01298-w
- How to cold e-mail for a PhD. 10.1038/d41586-023-00786-8
- Hail-prone days decreased across Australia but rose in some heavily populated areas from 1979 to 2021. 10.1038/s41612-023-00454-8
- Australian electricity could be fully powered by renewables at lower costs than current prices. 10.1016/j.renene.2023.119416
- Heat extremes are rapidly becoming more dangerous to human health. 10.1073/pnas.2316003120
- Climate influence on compound solar and wind droughts in Australia. 10.1038/s41612-023-00507-y
- Ocean heat uptake has accelerated in recent years, especially in mode and intermediate waters. 10.1038/s41467-023-42468-z
- Plant Functional Type classifications do not aid analytical skill in climate models. 10.1029/2023GL104962
- A new method to calculate the probability that a drought will break in Australia in real-time. 10.1016/j.wace.2023.100598

AWARDS & HONOURS

- John Church: Prince Albert I Medal
- John Church: International Science Council Fellow
- Matt England: Australian Academy of Science Jeager Medal
- Katrin Meissner: Petersen Excellence Professorship
- Andrea Taschetto: Outstanding Associate Editor Award, Journal of Southern Hemisphere Earth Systems Science
- Negin Nazarian: Timothy Oke Award

RESEARCH OUTPUTS

108 journal articles and 4 book chapters:

- 94% in SCIMAGO Q1 journals
- 4 publications in *Nature*
- 16 publications in *Nature* family journals
- 2 staff members are on the Clarivate Web of Science Highly Cited Researchers list.

TEACHING NEWS

- 662 enrolments in CLIM 1001 (Introduction to Climate Change)
- 131 enrolments in CLIM 2002 (Risks and Impacts of a Changing Climate)

CONNECTIONS TO OTHER CENTRES

- CCRC continues to lead the ARC Centre of Excellence for Climate Extremes
- CCRC hosts the new Climate & Weather node (through the Bushfire CNC)

LEADERSHIP

Sanaa Hobeichi developed a webpage for teachers with a range of climate-focused educational resources. She is also on the organising committee for the Australian Climate Education Summit and Action Plan 2024. CCRC hosted the Climate Classrooms teachers' workshop in collaboration with the Monash Climate Change Communication Research Hub where we worked with secondary school teachers and curriculum advisers to develop teaching resources. Sanaa Hobeichi also co-designed and developed an accredited data science elective course for Year 11 and published lesson plans that support integrating climate science in the high school STEM curriculum.

INTERNATIONAL LEADERSHIP

- **Steve Sherwood:** World Research Climate Programme (WCRP) Safe Landing Climates Lighthouse, co-chair
- **Lisa Alexander:** WCRP joint scientific committee; International Association of Meteorology and Atmospheric Sciences (IAMAS) executive committee; World Health Organization (WHO)/World Meteorological Organization (WMO) working group in occupational health; WMO Task Team for Extreme Heat Indicators and Indices; WMO Expert Team on Climate Information for Decision-making (ET-CID), co-chair; International Union of Geodesy and Geophysics (IUGG) liaison to WCRP
- **Katrin Meissner:** German Excellence Strategy, panel of experts; Past Global Changes (PAGES) Cycles of Sea-Ice Dynamics in the Earth system (C-SIDE) steering committee; PAGES Past Ocean Oxygenation (PO2) steering committee
- **Gab Abramowitz:** Global Land Atmosphere System Study (GLASS) panel, WCRP; International Land Modelling Forum (ILFM) steering group
- **Matt England:** International Universities Climate Alliance, academic lead; Southern Ocean Carbon and Heat Influence on Climate (SO-CHIC) advisory board chair; Scientific Steering Committee on Antarctic Research (SCAR) Near-term Variability and Prediction of the Antarctic Climate System (AntClimnow); Climate and Ocean - Variability, Predictability, and Change (CLIVAR) Climate Dynamics Panel
- **Jason Evans:** WCRP's Coordinated Regional Downscaling Experiment (CORDEX), science advisory team; WCRP CORDEX Australasia point of contact
- **Melissa Hart:** International Association for Urban Climate, elected board member; WCRP Academy steering group, co-chair
- **Sanaa Hobeichi:** International Office of Climate Education, board member
- **Martin Jucker:** Stratosphere-troposphere Processes And their Role in Climate (SPARC), WCRP, scientific steering group
- **Laurie Menviel:** International Union for Quaternary Research (INQUA) Termination 5 to 0 scientific group, steering committee; PAGES working group on Quaternary Interglacials (QUIGS), steering committee
- **Agus Santoso:** CLIVAR, WCRP, Tropical Pacific decadal variability working group; International Conference on Maritime Sciences and Advanced Technology (MSAT), scientific committee

- **Andréa Taschetto:** CLIVAR, WCRP, Pacific Regional Panel and Pacific Decadal Variability working group; CLIVAR, WCRP, Research Foci Tropical Basin Interactions
- **Alex Sen Gupta:** CLIVAR Marine Heatwave Research Focus Group
- **Abnhil Prasad:** Fresh Eyes on CMIP Steering Group
- **Tim Raupach:** Fresh Eyes on CMIP Model Evaluation subgroup

NATIONAL LEADERSHIP

- **Andy Pitman:** Australian Academy of Science (AAS) National Committee for Data in Science; AAS National Committee for Earth System Science; Australian Antarctic Science Council; Terrestrial Ecosystem Network (TERN) science advisory committee; National Environmental Science Program (NESP2) Climate Science Hub steering committee; Risk Frontiers advisory committee; UNSW nominee for the Australian Earth-System Simulator National Research Infrastructure (ACCESS-NRI) board
- **Matt England:** Federal Government's Reef 2050 independent expert panel; Australian Bureau of Meteorology Science advisory board; Australian Bureau of Meteorology Science advisory committee
- **Jason Evans:** NESP2 Climate Systems Hub leadership team; NSW Bushfire and Natural Hazards Climate and Weather Node leader.
- **Melissa Hart:** Australian Museum's Climate Solutions Centre advisory board; AMOS Uwe Radok PhD thesis prize committee, chair; Eureka prize for outstanding early career researcher, judge
- **Gab Abramowitz:** Australian Museum's Climate Solutions Centre advisory board
- **Laurie Menviel:** ACCESS-NRI scientific steering committee; ACCESS-NRI coupled modelling working group chair
- **Agus Santoso:** NESP2 Climate Systems Hub team member
- **Alex Sen Gupta:** AAS National Committee for Earth System Science
- **Anna Ukkola:** ACCESS-NRI land working group co-chair; Member of the scientific advisory committee for the National Computational Merit Allocation Scheme (NCMAS)
- **Lisa Alexander:** The Australian Meteorological and Oceanographic Society (AMOS) Morton and Zillmann Medal awards committee

EDITORIAL ROLES

- **Lisa Alexander:** Editorial Board Member, *Weather and Climate Extremes*
- **Jason Evans:** Guest Editor, *Weather and Climate Extremes*
- **Katrin Meissner:** Editorial Board, *Environmental Research Letters*
- **Laurie Menviel:** Co-Editor-in-Chief and Editor, *Climate of the Past*
- **Andy Pitman:** Associate Editor, *International Journal of Climatology*
- **Alex Sen Gupta:** Guest Editor, *Frontiers in Climate: Climate, Ecology and People*
- **Steve Sherwood:** Board of Review Editors, *Science*; Board Member, *Current Climate Change Reports*
- **Andréa Taschetto:** Editor, *Journal of the Southern Hemisphere Earth System Science*; Editor, *Meteorology and Climate of the Southern Hemisphere*; Guest Associate Editor, *Frontiers in Climate, Dynamics and Impacts of Tropical Climate Variability: Understanding Trends and Future Projection*; Guest Associate Editor, *Frontiers in Earth Science, Pacific Multi-Decadal Variability and ENSO Impact on the South American Climate*; Reviewer Editor, *Frontiers in Climate: Predictions and Projections*
- **Anna Ukkola:** Associate Editor, *Journal of Advances in Modeling Earth Systems*; Advisory editorial panel member, *Environmental Research Letters*

VISITORS

- Dr Julian Brimelow, Western University, Canada
- A/Prof Mauro Cirano, Federal University of Rio de Janeiro, Brazil
- A/Prof Scott Hottovy, US Naval Academy, Annapolis, USA
- Prof Thando Ndarana, University of Pretoria, South Africa
- Weiteng Qiu, Exeter University, UK
- Dr Caroline Ummenhofer, WHOI, USA
- Prof Doris Velede, Federal University of Pernambuco, Brazil

PROMOTIONS

Gab Abramowitz: Professor

GRADUATIONS

PhD STUDENTS

Maurice Huguenin-Virchaux
Zhi Li
Phuong Loan Nguyen
Jon Page
Charuni Pathmeswaran
Himadri Saini
Lina Teckentrup

HONOURS STUDENTS

Thomas Schanzer
Quincy (Forest) Tut

ENGAGEMENT WITH INDUSTRY

- Australia's Climate Advisory Council (Aon + CCRC) to address climate risks and best practices in Australia.
- CCRC hosted a science-industry workshop on severe convective storms.
- Advisory Committee to Minderoo Foundation, Climate summit (Sherwood, Meissner).
- Scientific Reference Panel for XDI / Climate Risk Engines (Abramowitz).
- Staff members contributed to several reports, briefing notes and presentations to industry (Aon, Guy Carpenter, Finity Consulting, Mytilineos, Suncorp, Insurance council of Australia) and NGOs (Secretariat of the Pacific Community).

ENGAGEMENT WITH GOVERNMENT

- Start of the new Weather and Climate Node (funded by DCCEEW) to develop an MPhil program to train students for jobs in government and industry.
- CCRC contributed to the National Environmental Science Program (NESP2) Climate Science Hub.
- Discussion with Parks Australia on using climate model projections data.
- Discussion on requirements for Climate Science with the National Adaptation Policy Office.
- Submission to NSW government inquiry on Net Zero Future bill 2023. Briefing to Federal department of Health on climate impacts on health.
- Submission to House of Representatives Committee on Inquiry into the implications of severe weather events on the national regional, rural, and remote road network.
- Working with Transport for NSW to deliver climate projections directly related to their future risks.
- Presentation to the Auditing and Assurance Standards Board and the Australian Accounting Standards Board on Climate modelling in Financial Reporting.
- Letter/Email submission to Treasury regarding climate-related financial disclosure.

MEDIA HIGHLIGHTS

- 51 newspaper articles
 - 24 radio and podcast interviews
 - 4 TV interviews
 - 1 Film/ Documentary
 - 7 Conversation articles
 - 8 stories in The Guardian
 - 3 in ABC News
- The Guardian: Marine heatwave off north-east Australia sets off alarm over health of Great Barrier Reef, July 2023, Alex Sen Gupta
 - The Conversation: Luminous 'mother-of-pearl' clouds explain why climate models miss so much Arctic and Antarctic warming, November 2023, Katrin Meissner, Deepashree Dutta, Martin Jucker
 - ABC News: How the Tonga volcano eruption from 2022 may affect Australia's weather for up to eight years, February 2023, Martin Jucker

ARC GRANTS & FELLOWSHIPS COMMENCING IN 2023

Grants (excluding CLEx and ACEAS) totalled \$2.9M. CCRC hosted two ARC Future Fellows (Lisa Alexander and Alex Sen Gupta) and two ARC DECRA Fellows (Anna Ukkola and David Hutchinson) in 2023. The CCRC also commenced one ARC Discovery Project (Jason Evans).

OUR VISION

THE CCRC'S VISION IS TO BE A WORLD-LEADING RESEARCH CENTRE IN CLIMATE SCIENCE, EDUCATING AND ENABLING THE AUSTRALIAN AND GLOBAL COMMUNITY TO DEAL WITH RISKS ASSOCIATED WITH CLIMATE VARIABILITY AND CLIMATE CHANGE.



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