

CLIMATE CHANGE RESEARCH CENTRE ANNUAL REPORT

2024



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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 HIGHLIGHTS

- Stratospheric water vapor spike after volcanic eruption causes lasting, seasonal, regional climate shifts. <https://doi.org/10.1175/JCLI-D-23-04371>
- Machine learning plugin improves physics schemes in climate models. <https://doi.org/10.5194/gmd-17-5459-2024>
- Bias correction narrows uncertainty in Australia's future carbon storage. <https://doi.org/10.1029/2024GL111398>
- Business climate risk needs location-specific storylines, not probabilities. <https://doi.org/10.1088/1748-9326/ad4377>
- Most land areas show weak links to climate modes. <https://doi.org/10.1038/s41612-024-00853-5>
- Above-average rain sped up vegetation recovery after Black Summer fires. <https://doi.org/10.1088/2515-7620/ad9dbd>
- Land surface temperature is a limited proxy for daytime urban temperatures. <https://doi.org/10.1088/1748-9326/ad8be4>
- Combined ice loss and meltwater boosted Antarctic subsurface warming during the Last Interglacial. <https://doi.org/10.1038/s41467-024-45501-x>
- Moisture rerouting explains onset of southeast Australia's major drought. <https://doi.org/10.1016/j.wace.2024.100672>
- Antarctic warm water intrusions occur without changing external forcing. <https://doi.org/10.1175/JPO-D-23-00671>

AWARDS & HONOURS

- Lisa Alexander: Copernicus Medal
- Steve Sherwood: American Geophysical Union Fellow
- Negin Nazarian: NSW Young Tall Poppy Science Award
- Alex Sen Gupta: Highly Cited Researcher
- Lisa Alexander: Highly Cited Researcher

CONNECTIONS TO OTHER CENTRES

- CCRC continues to lead the ARC Centre of Excellence for Climate Extremes
- CCRC hosts the UNSW node of the ARC Centre of Excellence for the Weather of the 21st Century
- CCRC hosts the Climate and Weather node of the NSW Bushfire and Natural Hazards Research Centre
- CCRC contributes to the National Environmental Science Program Climate Science Hub
- CCRC contributes to the ARC Antarctic Special Research Initiative
- CCRC has strong synergies with UNSW's Institute for Climate Risk and Response



RESEARCH OUTPUTS

132	3
Journal Articles	Book Chapters
93%	22
in SCIMAGO Q1 journals	Publications in <i>Nature</i> -family journals

TEACHING NEWS

RECORD ENROLMENTS IN OUR TWO ONLINE COURSES:

1032	156
enrolments in CLIM1001/ GENS0401 (Introduction to Climate Change)	enrolments in CLIM2002 (Risks and Impacts of a Changing Climate)

PROMOTIONS

Dr Martin Jucker: Senior Lecturer
Dr Anna Ukkola: Senior Lecturer

GRADUATIONS

PHD

Annette Stellema
Marzie Naserikia
Julia Neme
Hannah Dawson

HONOURS STUDENTS

Ruixian Zhang
Caleb Burke



CCRC Prize for the Best Student Paper

Xinyue Zhang



CCRC Prize for the Science Communication and Outreach

Katie Quail



John Church Student Culture Prize

Sibyl Cheng

INTERNATIONAL LEADERSHIP

- Steve Sherwood: World Research Climate Programme (WCRP) Safe Landing Climates Lighthouse, co-chair
- Lisa Alexander: WCRP joint scientific committee; World Meteorological Organization (WMO) Expert Team on Climate Information for Decision-making (ET-CID), co-chair; WMO Task Team for Extreme Heat Indicators and Indices; Australia Delegate to IAMAS (International Association of Meteorology and Atmospheric Sciences), and IUGG (International Union of Geodesy and Geophysics) Liaison Officer to WCRP
- Katrin Meissner: German Excellence Strategy, panel of experts; Global Ocean Oxygen Network (GO2NE) administered by The Intergovernmental Oceanographic Commission (IOC) of The United Nations Educational, Scientific and Cultural Organization (UNESCO), member; 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, WCRP) panel; International Land Modelling Forum (ILFM) steering group
- 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, board member; WCRP academy steering group, co-chair
- Martin Jucker: Atmosphere Processes And their Role in Climate (APARC, WCRP), scientific steering group
- Andy Pitman: Global Energy and Water Exchanges (GEWEX, WCRP) Ambassador
- Andréa Taschetto: Climate and Ocean - Variability, Predictability, and Change (CLIVAR, WCRP) Pacific Regional Panel, chair; CLIVAR, WCRP Working Group Atmospheric Teleconnections in a Warmer World, chair; CLIVAR, WCRP, Tropical Basin Interactions Research Foci, member

- Alex Sen Gupta: United Nations Association of Australia: Climate Change Panel; CLIVAR Marine Heatwave Research Focus Group, member
- Abhnil Prasad: Fresh Eyes on Coupled Model Inter-comparison Project (CMIP) Steering Group, member
- Tim Raupach: Fresh Eyes on Coupled Model Inter-comparison Project (CMIP) Model Evaluation subgroup, member

NATIONAL LEADERSHIP

- Andy Pitman: NSW Government Net Zero Commissioner; Australian Academy of Science (AAS) National Committee for Earth System Science, chair; Australian Earth-System Simulator National Research Infrastructure (ACCESS-NRI) board; Terrestrial Ecosystem Network (TERN) science advisory committee; Australian Antarctic Science Council; National Environmental Science Program (NESP2) Climate Science Hub steering committee; Risk Frontiers advisory committee; Australian Standards Technical Committee on Sustainable Finance; EPA Climate Change Community and Environment Advisory Group
- Alex Sen Gupta: AAS National Committee for Earth System Science
- Laurie Menviel: ACCESS-NRI scientific steering committee
- Jason Evans: NESP2 Climate Systems Hub leadership team; NSW Bushfire and Natural Hazards Climate and Weather Node lead
- Melissa Hart: Australian Museum's Climate Solutions Centre advisory board
- Gab Abramowitz: Australian Museum's Climate Solutions Centre advisory board
- Anna Ukkola: ACCESS-NRI land working group, co-chair; Scientific advisory committee for the National Computational Merit Allocation Scheme (NCMAS)
- David Hutchinson: ACCESS-NRI earth system modelling group, co-chair

VISITORS

- Dr Lincoln Alves, National Institute for Space Research, Brazil
- Dr Michiel Baatsen, Utrecht University, Netherlands
- Dr Helen Cleugh, Australian National University, Australia
- Dr Willem Huiskamp, Potsdam Institute for Climate Impact Research, Germany
- Professor Noel Keenlyside, University of Bergen, Norway
- Professor Dan Kirshbaum, McGill University, Montreal, Canada
- Dr Kai Kornhuber, International Institute for Applied Systems Analysis, Austria
- Dr Tomoki Miyakawa, Atmosphere and Ocean Research Institute, AORI, University of Tokyo, Japan
- Dr Francesco Muschitiello, University of Cambridge, UK
- Professor Andreas Oschlies, GEOMAR, Germany
- Professor Seon Ki Park, Ewha Women's University, Seoul, Korea
- Dr Joe Scutt Phillips, Secretariat for the Pacific Community, New Caledonia
- Dr Isla Simpson, NCAR, USA
- Professor Simon Tett, University of Edinburgh, UK
- Professor Karen Wiltshire, AWI, Germany

EDITORIAL ROLES

- Steve Sherwood: Science Magazine, Board of Review Editors; Current Climate Change Reports, Board Member
- Laurie Menviel: Climate of the Past, Co-Editor-in-Chief and Editor
- Andy Pitman: Environmental Research: Climate, Editor
- Lisa Alexander: Weather and Climate Extremes, Editorial Board Member; International Journal of Climatology, International Advisory Board; Climatic Change, Editorial Advisory Board
- Anna Ukkola: Journal of Advances in Modeling Earth Systems, Associate Editor; Environmental Research Letters, Advisory Editorial Panel Member
- Andréa Taschetto: Journal of the Southern Hemisphere Earth System Science, Editor; Meteorology and Climate of the Southern Hemisphere, Editor; American Meteorological Society (AMS) - Special Collection on the 2014-2024 ENSO Decade, Organizer
- Jason Evans: Weather and Climate Extremes, Guest Editor; PLOS Climate, Section Editor
- Alex Sen Gupta: Frontiers in Climate: Climate, Ecology and People, Guest Editor
- Katrin Meissner: Environmental Research Letters, Editorial Board

ENGAGEMENT WITH INDUSTRY

- Australia's Climate Advisory Council (Aon + CCRC) to address climate risks and best practices in Australia
- Lethal Humidity Global Council, Minderoo Foundation (Sherwood, Meissner)
- Scientific reference panel for private company XDI/ Climate Risk Engines (Abramowitz)
- Workshop with finance industry on economic modelling of climate (Sherwood)
- Australian Leadership Retreat (Australian Davos Connection Forum, Meissner)
- Industry briefings: Energetics, Aon Japan, Aon Global, Fortescue
- Several presentations to stakeholders
- Participation at UNSW Expos: Future Climate & Clean Energy Expo (Raupach); Future Defence & Security Expo (Meissner, Hutchinson); Urban Futures Expo (Raupach)
- Risk Frontiers (Pitman)

ENGAGEMENT WITH GOVERNMENT

- NSW Net Zero Commissioner (Pitman)
- CCRC leads the Weather and Climate Node (through the NSW Bushfire and Natural Hazards Research Centre) for a MPhil program to train students for jobs in government and industry (funded at 1.2M)
- CCRC contributed to the National Environmental Science Program (NESP2) Climate Science Hub
- Two ARC linkage grants with the NSW Department of Climate Change, Energy, the Environment and Water
- Climate Change Authority's consultation 2024 Issues paper: Targets, Pathways and Progress (Pitman, Sherwood)
- Inquiry into the importance of Antarctica to Australia's national interests (Pitman)
- National Academies' study on the Attribution of Extreme Weather and Climate Events and their Impacts (Alexander)
 - UNSW Parliament House Showcase talking to politicians and advisors about the value of climate research (Alexander)
- Ongoing advice on hail and climate change to the Australian Climate Service (Raupach)
 - Organisation of the Australian Academy of Science Fenner Conference on the Environment on the long-term future of drought in Australia (Ukkola)
 - Several presentations: at the National Academies of Sciences, Engineering and Medicine (Alexander), the Department of Climate Change, Energy, the Environment and Water (Taschetto), the Bureau of Meteorology (Ukkola); the National Security College's executive development program National Security Foundations States and Territories (Evans); Infrastructure Victoria (Meissner); NESP stakeholders (Taschetto)
 - Panel participation at NSWAdapt Forum (Taschetto)

RESEARCH INCOME & FELLOWSHIPS

Grants (excluding the ARC Centre of Excellence for Climate Extremes, Australian Centre for Excellence in Antarctic Science and the ARC Centre of Excellence for the Weather of the 21st Century) totalled \$3.5M. CCRC hosted two ARC Future Fellows (Alexander and Sen Gupta) and two ARC DECRA Fellows (Ukkola and Hutchinson)

MEDIA HIGHLIGHTS

- 29 newspaper articles (the Conversation, Sydney Morning Herald, the Guardian, UTS Vertigo, the Malaysian Star, Spiegel, South China Morning Post, Cosmos, 9news, the New Daily)
- 15 radio and podcast interviews (ABC radio, 2GB, 2SM, 2BS)
- 8 TV interviews (ABC news, SBS news, 7news, Sky news, TV2 Denmark)
- Why Christmas Day weather predictions this early in December are basically 'rubbish', The Guardian. <https://www.theguardian.com/environment/2024/dec/06/christmas-day-weather-forecasts-bom-when-to-check>
- Landmark new research shows how global warming is messing with our rainfall, The Conversation. <https://theconversation.com/landmark-new-research-shows-how-global-warming-is-messing-with-our-rainfall-233432>
- Corporations using 'ineffectual' carbon offsets are slowing path to 'real zero', more than 60 climate scientists say, The Guardian. <https://www.theguardian.com/environment/2024/oct/28/corporations-using-ineffectual-carbon-offsets-are-slowng-path-to-real-zero-more-than-60-climate-scientists-say>

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

