

CLIMATE CHANGE RESEARCH CENTRE
ANNUAL REPORT

2022



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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

- Sydney subhourly rainfall extremes have increased over the past 20 years. [10.1126/science.abn8657](https://doi.org/10.1126/science.abn8657)
- Currently used 'top-down' approaches are not appropriate to evaluate financial risk. [10.1088/2752-5295/ac856f](https://doi.org/10.1088/2752-5295/ac856f)
- Delaying net zero decreases the probability of achieving the Paris 1.5°C target by 3–4% per year. [10.1088/1748-9326/ac6ff6](https://doi.org/10.1088/1748-9326/ac6ff6)
- Southern Ocean forcing causes almost all of the global ocean heat uptake. [10.1038/s41467-022-32540-5](https://doi.org/10.1038/s41467-022-32540-5)
- Frequencies of heatwave-drought compound events will increase everywhere. [10.1038/s41612-021-00224-4](https://doi.org/10.1038/s41612-021-00224-4)
- A collapse of the Atlantic Overturning Circulation accelerates Pacific trade winds & the Walker circulation. [10.1038/s41558-022-01380-y](https://doi.org/10.1038/s41558-022-01380-y)
- The impact of land cover on urban temperatures depends on background climate. [0.1038/s41598-022-19431-x](https://doi.org/10.1038/s41598-022-19431-x)
- Wet gets wetter but dry does not get drier. [10.1038/s41612-022-00240-y](https://doi.org/10.1038/s41612-022-00240-y)
- Comparison between, and assessment of, 12 stomatal conductance schemes. [10.1029/2021MS002761](https://doi.org/10.1029/2021MS002761)
- Accumulated dust can cause 8–9% of energy reductions in Australian solar farms. [10.1016/j.jpenerg.2022.118626](https://doi.org/10.1016/j.jpenerg.2022.118626)

NEW ACADEMIC STAFF MEMBERS

Welcome to ARC DECRA Fellow Dr. Anna Ukkola, drought expert who was appointed to the CCRC Climate Risk Position in 2022. Dr. Tim Raupach was appointed on a fixed-term position bringing expertise in hail to the centre.

AWARDS & HONOURS

- Andy Pitman: Appointed Scientia Professor
- John Church: Royal Society of NSW James Cook Medal 2022
- Matt England: Top 100 Green Power Player (The Australian)
- Rishav Goyal: Dean's Award for Outstanding Thesis

RESEARCH OUTPUTS

2 reports, 1 book, and 151 journal articles:

- 82% in SCIMAGO Q1 journals
- 4 publications in *Nature*, 1 in *Science*
- 21 publications in Nature family journals
- 3 staff members on the Clarivate Web of Science Highly Cited Researchers list

LEADERSHIP & ENGAGEMENT

LEADERSHIP

CCRC hosted the Climate Classrooms teachers' workshop at UNSW in collaboration with the Monash Climate Change Communication Research Hub where we worked with secondary school teachers and curriculum advisers to develop teaching resources. We 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

Lisa Alexander: WCRP joint scientific committee; International Association of Meteorology and Atmospheric Sciences (IAMAS) executive committee; Joint World Meteorological Organization (WMO)/Intergovernmental Oceanographic Commission (IOC) collaborative board; World Health Organization (WHO)/WMO working group in occupational health

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)

Jason Evans: WCRP's Coordinated Regional Downscaling Experiment (CORDEX), science advisory team

Melissa Hart: International Association for Urban Climate, elected board member

Sanaa Hobeichi: International Office of Climate Education

Martin Jucker: Stratosphere-troposphere Processes and their Role in Climate (SPARC), WCRP, scientific steering group

Katrin Meissner: German Excellence Strategy, panel of experts; Swiss National Science Foundation, panel of experts

Laurie Menviel: International Union for Quaternary Research (INQUA) Termination 5 to 0 scientific group, steering committee and organiser of 2022 workshop; Past Global Changes (PAGES) working group on Quaternary Interglacials (QUIGS), steering committee

Agus Santoso: Climate and Ocean - Variability, Predictability, and Change (CLIVAR), WCRP, Tropical Pacific decadal variability working group

Steve Sherwood: WCRP Safe Landing Climates Light-house, co-chair; Frontier's Planet Prize jury; Max Planck directorship appointment committee

Andréa Taschetto: CLIVAR, WCRP, Pacific Regional Panel and Pacific Decadal Variability working group; CLIVAR, WCRP, Research Foci Tropical Basin Interactions

NATIONAL LEADERSHIP

Gab Abramowitz: Australian Museum's Climate Solutions Centre advisory 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: National Environmental Science Program (NESP2) Climate Systems Hub leadership team

Melissa Hart: Australian Museum's Climate Solutions Centre advisory board

Laurie Menviel: Australian Earth-System Simulator National Research Infrastructure (ACCESS-NRI) scientific steering committee; ACCESS-NRI coupled modelling working group chair

Andy Pitman: Terrestrial Ecosystem Network (TERN) science advisory committee; NESP2 Climate Science Hub steering committee; ACCESS-NRI board; Australian Academy of Science National Committee for Data in Science; Australian Academy of Science National Committee for Earth System Science; Risk Frontiers advisory committee

Agus Santoso: NESP2 Climate Systems Hub team member

Alex Sen Gupta: Australian Academy of Science National Committee for Earth System Science

Anna Ukkola: ACCESS-NRI land working group co-chair

ENGAGEMENT WITH INDUSTRY

Formation of Australia's Climate Advisory Council by Aon and CCRC to address climate risks and best practices in Australia

Two new CCRC Adjunct Fellows: Thomas Mortlock (Aon) and Alexander Pui (Commonwealth Bank)

Contributed to a number of reports, briefing notes and presentations to industry (Aon, Guy Carpenter, XDI Climate Risk Engines, European Union Aviation Safety Agency (EASA), Mytilineos, Energetics, Swiss Re) and NGOs (with Secretariat of the Pacific Community)

ENGAGEMENT WITH GOVERNMENT

Briefings and presentations to Tony Hirst (Australian Climate Service), the Federal Department of Health, Transport for NSW, Auditing and Assurance Standards Board, Australian Accounting Standards Board, NSW Independent Planning Authority, Treasury, Office of National Security, NSW Minister Cooke (Minister for Emergency Services and Resilience, and Minister for Flood Recovery), NSW Minister Griffin (Minister for Environment and Heritage)

Public hearing as part of the House of Representatives Standing Committee on Regional Development, Infrastructure and Transport's inquiry into the implications of severe weather events on the national regional, rural, and remote road network

Research projects with Transport for NSW, NSW Department of Planning and Environment, National Partnership for Climate Projections

EDITORIAL ROLES

- **Lisa Alexander:** Editor-in-Chief and Editorial Board Member, *Weather and Climate Extremes*
- **Jason Evans:** Guest Editor, *Weather and Climate Extremes*
- **Laurie Menviel:** Co-Editor-in-Chief and Editor, *Climate of the Past*
- **Katrin Meissner:** Editorial Board, *Environmental Research Letters*
- **Andy Pitman:** Associate Editor, *International Journal of Climatology*
- **Agus Santoso:** Editor, *Journal of Climate*; Associate Editor, *Frontiers in Climate: Predictions and Projections*; Guest Editor, *Frontiers in Climate: Dynamics and Impacts of Tropical Climate Variability: Understanding Trends and Future Projections*; Editorial Board Member, *Journal of Science & Technology Indonesia*
- **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:** 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*; Editor, *Journal of the Southern Hemisphere*
- **Anna Ukkola:** Advisory editorial panel member, *Environmental Research Letters*

CONNECTIONS TO OTHER CENTRES

- CCRC continues to lead the ARC Centre of Excellence for Climate Extremes (CLEX)
- CCRC contributes to the National Environmental Science Program (NESP2) Climate Science Hub
- CCRC contributes to the ARC Antarctic Special Research Initiative (ACEAS)
- CCRC will contribute to the newly funded ARC Centre of Excellence for the Weather of the 21st Century (W21C), starting in 2023
- CCRC contributes to the newly established UNSW Institute for Climate Risk and Response (ICRR)

TEACHING NEWS

- 554 enrolments in CLIM1001 (Introduction to Climate Change)
- 98 enrolments in CLIM2002 (Risks and Impacts of a Changing Climate)
- Involved in new course on Corals and Climate (MSCI2060)

GRADUATIONS

PHD STUDENTS

Hooman Ayat
Shreya Dhame
Deepashree Dutta
Rishav Goyal
Mengyuan Mu
Luis Orihuela Pinto
Manon Sabot

HONOURS STUDENTS

Grace Cox
Shalini Rome

MEDIA HIGHLIGHTS

- 82 news articles
 - 40 radio and podcast interviews
 - 19 TV interviews
 - 27 stories in ABC outlets (radio/television/online)
 - 10 stories in The Conversation
 - 17 stories in The Guardian
- The Sydney Morning Herald: Sea temperatures inch towards record high but marine ecosystems could suffer, January 2022, Andréa Taschetto
- The Conversation: Smoke from the Black Summer fires could have made the triple La Niña more likely, May 2022, Martin Jucker
- ABC News: Sydney smashes July rainfall record dating back to 1858, and on track to break annual record, July 2022, Agus Santoso

GRANTS

Current grants (excluding CLEEx and ACEAS) totalled \$1.8m. One ARC Future Fellowship (Lisa Alexander) and one ARC DECRA Fellowship (David Hutchinson) started in 2022. Alex Sen Gupta was awarded an ARC Future Fellowship in 2022 (to start in 2023). The CCRC also commenced one ARC Discovery Project (Laurie Menviel) in 2022 and Jason Evans was awarded an ARC Discovery Project in 2022 (to start in 2023).

VISITORS

- Prof. Soon-Il An, Yonsei University, South Korea
- Dr. Michael McPhaden, NOAA, USA
- Dr. Caroline Ummenhofer, Woods Hole, USA

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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