

ANNUAL REPORT

2016

Climate Change Research Centre

ANNUAL REPORT 2016

Climate Change Research Centre

Our Vision

The CCRC strives to make fundamental contributions to our understanding of the Earth's climate system and be recognised as one of the world's top research programs in physical and biophysical climate sciences.





Table of Contents

Centre Vision	2
Table of Contents	3
Director's Report	4
CCRC at a Glance	5
Personnel	6
Research outputs Centre Impact & Grant Summary	7
Snapshot 1 – Research	8
Research supervision & Teaching	9
Snapshot 2 – High Impact Science	10
Statement of Financial Performance	11
Signed Statement of Financial Performance	12
Statement of In-kind contributions	13
Management & Oversight	14
Appendix A – 2016 Publications	15
Active Research Projects	25
Appendix C – Centre Personnel	34
Appendix D – Media & Publicity	36

Director's Report

The big news of 2016 was undoubtedly the awarding by the ARC of a new Centre of Excellence for Climate Extremes, with the CCRC again the lead institution and Prof. Andy Pitman the Director. This \$30M Centre will be the successor to the ARC Centre of Excellence for Climate System Science, which will continue through mid-2018. The new Centre, which will be known as CLeX, will begin operations in mid-2017 (which means one year of overlap during which things may be slightly busier than usual). The shorter acronym already bodes a leaner and snappier centre this time around.... The CIs on this new effort besides Andy are myself, Matt England, Lisa Alexander, Jason Evans and Gab Abramowitz; Stephen Gray will also transition over to become the Centre Manager. Congratulations to Andy and the rest of the CLeX team for a great outcome! Look forward to news in next year's annual report about how this exciting new centre is progressing.

The other new event for this year was the initiation of the inaugural UNSW Grand Challenge in Climate Change, led by Matt England. This initiative began in late 2016 and will produce a series of thought-provoking lectures and events to get the UNSW community thinking more broadly about climate change and what is needed to meet the challenges. Let us all hope that in addition to talking this may identify new actions that can be taken by the university and society at large.

Matt completed the trifecta by also winning election as an AGU Fellow, a rare honour. Centre researchers won three ARC Fellowships: a Future Fellowship for Andrea Taschetto, and DECRA Fellowships for Leela Frankcombe and Alejandro Di Luca. Last but not least, two of our Ph.D. students won prestigious awards: Nicola Maher won a Helmholtz Fellowship to do postdoctoral research at the Max Planck Institute in Hamburg, Germany, and Tim Cowan won AMOS's Uwe Radok award for best Ph.D. thesis.

Research activity in 2016 has held steady at the record high levels achieved in 2015, with roughly \$2M in external funding (not counting the ARCCSS) and nearly 150 publications. Findings of new high-profile research led by CCRC staff included new recognition of the links between westerly winds and Antarctic sea ice changes, and human-induced amplification of the natural seasonal cycle in ocean acidification which will unfortunately lead to earlier crossing of dangerous thresholds for marine life.

To finish, this is the final Director's Report I will be writing, as in 2017 I will be stepping down as CCRC Director. I will not be retiring to grow mushrooms just yet, but look forward to more time with my growing research group! The new Director will be A/Prof. Katrin Meissner, who will undoubtedly bring efficiency and vigour to the role. I would like to take this opportunity to thank everyone for all their support during my five years as Director, and to wish Katrin all the best as the centre moves forward.



Professor Steven Sherwood

CCRC at a Glance

UNSW CCRC is a multi-disciplinary research group comprising one of the largest university research facilities of its kind in Australia. 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.

The Climate Change Research Centre (CCRC) was formed within the Faculty of Science in 2008 with initial financial support from the DVC Research and the Faculty. The Centre and its staff now reside in the School of Biological Earth and Environmental Science (BEES). CCRC currently hosts the UNSW lead node of the Australian Research Council Centre of Excellence for Climate System Science (ARCCSS). Starting July 1st 2017, the CCRC will also host the newly awarded Australian Research Council Centre of Excellence for Climate Extremes.

CCRC research focuses on basic climate system science across several core disciplines. The CCRC interacts with numerous schools and Centres on campus. Within the Faculty of Science particularly strong research and teaching synergies exist between the Centre and the Schools of Mathematics and Statistics, Physics and Biological Earth and Environmental Sciences (BEES). Its research focus is innovative and arguably unique among university units worldwide, and it has quickly grown into the largest hub of such research in the Australian region.

2016 saw the CCRC continue its successful track record in attracting grant funding and producing and publishing excellent, world-class research.

Key Achievements

- Awarded the ARC Centre of Excellence for Climate Extremes, led by Prof. Andy Pitman
- 2 million external research revenue
- Prof. Matt England led the inaugural UNSW Grand Challenge in Climate Change
- 144 peer reviewed publications, an increase of 3.6% over 2016 figures. The vast majority of our publications are in top, highly ranked journals
- High-profile publications like Ph.D. student A. Purich, et al., 'Evidence for link between modelled trends in Antarctic sea ice and underestimated westerly wind changes' in *Nature Communications*
- CCRC Staff extensively quoted and interviewed in the media with 128 articles, interviews, appearances or quotes
- 41 papers published by HDRs in 2016 including 4 published in *Nature* group. 23 of these papers had CCRC students listed as lead author in journals including *Nature Communications*
- and *Journal of Climate*. A further 18 papers had students listed as co-author.
- Since 2008, CCRC has produced 877 publications.
- Between 2013 and 2016, the CCRC published 51 papers in Science and Nature-family

Personnel Highlights

- Professor Matt England named in the 2016 Class of AGU Fellows. Only 0.1% of AGU members receive this honour in any single year.
- Dr Sarah Perkins-Kirkpatrick received AMOS's Early Career Research Award.
- Dr Tim Cowan won AMOS's Uwe Radok award for best Ph.D. thesis.
- Dr Alejandro Di Luca and Dr Leela Frankcombe were awarded ARC DECRA Fellowships, commencing in 2017
- Dr Andrea Taschetto was awarded an ARC Future Fellowship to commence in 2017
- CCRC Alumni were also awarded an ARC Future Fellowship (Dr Shayne McGregor) and ARC DECRA Fellowship (Dr Jatin Kala) to commence in 2017.
- Prof. Chris Turney named as UNSW node Director and Climate theme leader for the ARC Centre of Excellence for Australian Biodiversity and Heritage (CABAH)
- CCRC Welcomed 5 new fixed term researchers
- Donna Green promoted to A/Professor
- Katrin Meissner won the 2016 UNSW Science Staff Excellence Award in Equity, Diversity and Inclusion for her GERL lunch initiative.
- Martin Thompson received the UNSW Science Staff Excellence Award in Research Quality for outstanding working supporting the research IT capacity of the CCRC and also supporting CCRC staff.
- Vilia Co and Bronwen Smith received the 2016 UNSW Staff Excellence Award for Excellence in Environmental Sustainability through AdminNet
- Stephen Gray received the ARCCSS Director's Prize in 2016

2016 Personnel

The Climate Change Research Centre has a well-established culture of excellence, collegiality and collaboration both within and across traditional disciplinary boundaries. We are strongly committed to effective professional development of our mid and early career researchers. The centre is comprised of a core cohort of 10 permanent faculty, each of whom lead research groups comprised of research associates and HDR students.

Continuing staff appointed to the CCRC included two Laureate Fellow (England & Sherwood), one ARC Future Fellows (Evans). The Centre also hosts 5 ARC DECRA Fellows (Menviel, Donat, Kirkpatrick, Spence, Liu).

The CCRC also houses Chris Turney, a Laureate Fellow appointed to BEES. Chris' research group includes Future Fellow Dr. Chris Fogwill.

The Centre continued to attract distinguished visitors on sabbatical stays including UNSW Faculty of Science Visiting Research Fellow Professor Stefan Rahmstorf (Potsdam University) and Professor Michael Goldstein (Babson College) who both spent several months working closely with CCRC staff.

The Centre is also a sought-out destination for international researchers making shorter visits. We welcomed around 30 research visitors to the CCRC in as well as hosting many seminar speakers from around Australia and overseas; thus demonstrating that the Climate Change Research Centre has critical momentum that enhances UNSW's reputation at the very forefront of Climate Science in Australia.

A full list of personnel associated with the Centre in 2016 appears in Appendix C.

Research Outputs, Centre Impact & Grant Summary

The CCRC published 144 individual peer reviewed outputs in 2016. The CCRC continues to publish papers primarily in the highest impact, high-quality journals - those ranked A and A* under the former ERA scheme and those with a high Thomson ISI impact factor. See Appendix A for a full list of publications.

The CCRC has also been the headquarters for the ARC Centre of Excellence for Climate System Science (ARCCSS) since 1 July 2011, and from 1 July 2017 the centre will house the newly awarded ARC Centre of Excellence for Climate Extremes. In addition to ARCCSS Director Andy Pitman, 4 CCRC academic staff are Chief Investigators in the Centre of Excellence - Alexander, England, Hart and Sherwood. A further 12 CCRC staff were Associate Investigators in 2016. (Abramowitz, Donat, Evans, Green, Liu, Maharaj, Meissner, Menviel, Perkins, Santoso, Sen Gupta, and Taschetto). From July 1 Prof. Andy Pitman will move on to CLEx Director. Prof. Christian Jakob (Monash University) will take over as Director of ARCCSS, with Prof. Matt England taking on the role of ARCCSS Co Director.

The two centres successfully share space and administrative support and there are significant opportunities for collaboration across the research strengths and foci of both groups.

UNSW and the CCRC particularly benefit from access to supercomputing resources at NCI as well as increased collaboration with overseas partners via the linkages formally established by the Centre of Excellence. The CCRC graduate student experience is further enhanced by ARCCSS activities such as winter schools, writing workshops, visits to Australian partner universities and opportunities for travel to overseas labs, summer schools and workshops and the mentorship and pastoral care provided by both the CCRC Postgraduate Coordinator (Dr Gab Abramowitz) and the ARCCSS Graduate Director, Dr Melissa Hart.

The Centre continued from strength to strength in 2016 with three highly talented postdoctoral researchers awarded ARC grants: DECRA: Dr Leela Frankcombe and Dr Alejandro Di Luca, Future Fellowship: Dr Andrea Taschetto. The research presence of the CCRC and ARCCSS on campus continues to be promoted with Jason Evans continuing as the Centre's representative to the Science Faculty Research Management Committee (in addition to his role as IT coordinator).

Witek Bagniewski, Annika Dean, Willem Huiskamp, Nicola Maher and Shirley (Xuerong) Qin submitted PhD theses and were all subsequently awarded their doctorates. We wish them well in their future endeavours in the postdoctoral research positions they secured in Australia and overseas

2016 Impact

- Awarded the ARC Centre of Excellence for Climate Extremes, led by Prof. Andy Pitman
- 2 papers published in Nature (Donat and McNeil)
- 5 papers published in Nature family journals.
- 1 paper published in Science (Turney)
- 8 papers in Geophysical Research Letters
- 2 papers published in Journal of Climate
- Significant media coverage of Centre research accomplishments in 2016 including: 7 TV appearances / interviews, 23 Radio appearances/interviews, 98 print and online articles, interviews and op eds
- Professor Matt England elected as AGU Fellow and head of the UNSW Grand Challenge for Climate Change
- 2 of our Ph.D. students won prestigious awards: Nicola Maher won a Helmholtz Fellowship to do postdoctoral research at the Max Planck Institute in Hamburg, Germany, and Tim Cowan won AMOS's Uwe Radok award for best Ph.D. thesis
- Dr Sarah Perkins Kirkpatrick awarded AMOS's Early Career Research Award
- Responsible for 21% (51/238) of UNSW's Science/ Nature family papers in 2013-2016 (40% of 131 non-medicine papers)

Snapshot 1 – Research:

How climate change increases inequality

At a time when the University of New South Wales has grand challenges for climate change and inequality, Dr Nicholas Herold led a team of Climate Change Research Centre scientists in a paper that crossed over into both realms.

In research published in *Environmental Research Letters*, Dr Herold's team showed the world's poorest countries were already experiencing temperature extremes far more frequently than the world's richest countries, due to global warming. He found poorer countries were experiencing substantially greater increases in hot days and warm nights compared to richer countries as a result of climate change and had been for at least the past two decades.

The stark difference in impacts was revealed when the researchers looked at the increase in the number of days that exceeded the hottest 10% of all days recorded for the wealthiest and poorest countries.

They first looked at the average number of extremely hot days from 1961-1990 and used that as the baseline. They repeated the process for night-time temperatures.

For the period 1961-1990, wealthy and poor countries experienced approximately the same number of extremely hot days and nights, around 10% (37 days) every year. But by 2010, wealthy nations saw an increase in extremely hot days from 10% to 16% (37-58 days per year) while the poorest nations saw that number rise to 22% (37-95 days per year).

If this trend continues unabated, then these poor countries could see hot days occurring 30% (130 days) of each year within the next two decades.

This result is largely due to the location of the poorest nations, which are mostly found in equatorial regions, while wealthier countries tend to be found in temperate zones.

When the high temperatures of the tropical regions are coupled with low variability and high humidity, even small temperature increases have big impacts.

In public comments on the findings, Dr Herold noted that the human body could only acclimatise so much to increasing temperatures. He called for wealthy countries, which have contributed the most emissions to human caused climate change, to consider the damage already done by climate change to poorer

Research Supervision & Teaching

The Climate Change Research Centre has a growing cohort of postgraduate research students. There were 43 students enrolled in the Centre's PhD program supervised in 2016. The CCRC has benefited greatly from the ARCCSS summer scholar scheme which provides funding for undergraduate students to undertake small research projects, supervised by an ECR over the summer. Many of our recent honours and PhD applicants have been previous summer scholars.

The CCRC continued its robust annual progress review scheme, led by the Centre's Post Graduate Coordinator, Dr Gab Abramowitz. In addition to the stipulated annual reviews and presentations for all students, the Centre runs half-yearly "informal" committee meetings for all enrolled students where progress can be discussed and students can raise any concerns they may have. Feedback from students regarding the Centre's review process is overwhelmingly positive. The Centre also invites a nominated student representative to join its bi-monthly staff meetings.

CCRC continued to align its postgraduate review schedule with that of BEES. Dr Alex Sen Gupta continues as the PhD completion coordinator for the whole School as well as the BEES representative on the HDR Committee. Dr Abramowitz continues to look after the recruitment and progression of PhD students within the CCRC. Dr Donna Green served on a BEES honours committee in 2016 and continues to look after the CCRC Honours student cohort as well as the sole nominated BEES staff member on the Science Faculty Board.

Courses run by CCRC staff are CLIM1001 – Introduction to Climate Change, MSCI0501 – The Marine Environment (with the School of BEES), CLIM2001 – Fundamentals of Atmospheric Science (with the School of Physics) GEOS2241 – Peak Carbon: Climate Change and Energy Policy and CLIM3001 – Climate Systems Science.

CCRC is in the process of re-designing CLIM1001 to an online-only course, first offered in S2 2017.

CCRC Staff also regularly give guest lectures in courses taught by a number of other schools.

5 PhD students submitted 2016.

- Witek Bagniewski. PhD (*Supervised by Katrin Meissner*)
- Annika Dean. PhD (*Supervised by Donna Green*)
- Willem Huiskamp. PhD (*Supervised by Katrin Meissner*)
- Nicola Maher. PhD (*Supervised by Matt England*)
- Shirley (Xuerong) Qin. PhD (*Supervised by Alex Sen Gupta*)



Snapshot 2 – High Impact Science: *Harder rains are going to fall on Australia*

Dorothy Mackellar's view of Australia as a land of droughts and flooding rains will gain further impetus with global warming according to research led by Climate Change Research Centre (CCRC) PhD student Jiawei Bai that was published in *Nature Climate Change* this year.

The paper showed global warming would have a significant influence on the most extreme precipitation events in Australia. It revealed that with a 2°C rise in global temperatures, extreme rain events in Australia would increase by 11.3 – 30%. Intriguingly this increase would be equally likely in arid and wet regions alike.

In the process of the research it also became clear that even if Australia became more arid, we should still expect at least a 10% increase in extreme precipitation events.

In short, with 2°C of global warming Australia would experience more aridity, much heavier extreme rains, or some combination of the two. In a world where temperatures had risen by 4°C, which most closely fits the current trajectory of warming and policy responses, extreme rainfall events increased by 22 – 60%.

The study used regional climate models to clarify conflicting inferences drawn by previous studies from observed extreme rainfall events. The modelling work was performed by the NSW ACT and Regional Climate Model project, a project that was developed by CCRC scientists working with the NSW Department of Environment and Heritage.

In using this model Jiawei and his CCRC colleagues focused on the cities of Darwin, Sydney and Melbourne to look at the heaviest 1% of rainfall events for each of them in a warming world. The results showed the key to the change in extreme precipitation was humidity, with greater than average humidity leading to a sharp increase in extreme rain events. This research goes to the heart of helping Australia's infrastructure cope with future climate change. Making plans of future needs by drawing on past observations cannot help us when extreme events are changing so rapidly.

Paper: *Future increases in extreme precipitation exceed observed scaling rates*. *Nature Climate Change*.



Statement of Financial Performance

Summary of statement of financial performance

The Climate Change Research Centre's total revenue for 2016 was \$ 5.6m. \$1.98m of this was from external income sources. The remainder was from a combination of Faculty and Central/Strategic funds, including wind down funding associated with Matthew England's Laureate Fellowship, LIEF and MREll grants.

Of the \$1.99m research revenue earned in 2016, \$1.47m (74%) was Category 1 income. This research income figure does not include the additional funding allocated to the ARC Centre of Excellence for Climate System Science from the ARC, Partner Organisations and UNSW strategic funds.

At 77% of total expenditure, people costs account for by far the largest portion of the Centre's expenditure across all fund types. Total 2016 expenditure was \$ 5.8m. The CCRC's 2016 opening carry over was \$1.46m. The closing carryforward was a surplus of \$1.24m.

Full countersigned financial statement follows.

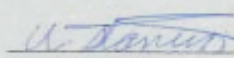
Climate Change Research Centre - CCRC

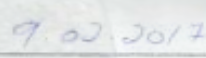
Statement of Financial Performance for the Year Ended 31 December 2016

	Notes	2016 \$	2015 \$
Funds:			
Research Funds		1,988,033	2,205,607
ARC Research Funds	1	1,471,339	1,770,096
NHMRC Research Funds		-	-
Other External Research Funds		569,000	414,425
Fundraising Contributions		-	12,947
Faculty Contributions	2	2,499,965	2,234,536
UNSW Contributions		1,116,579	1,015,887
Strategic Funds	3	657,037	569,186
MREII		179,340	-
Super Science & LIEF UNSW Contributions		156,100	217,660
EB Gap		124,102	229,041
Total Funds:		5,604,577	5,456,030
Costs:			
People Costs	4	4,492,390	4,292,357
Scholarship Stipends		339,527	332,654
Travel	5	272,275	375,056
Equipment		229,029	74,592
Other Non People Costs		476,849	297,759
Total Costs:		5,810,070	5,372,418
Operating result	-	205,492	83,612
Opening Balance: Surplus(Deficit) from Prior Year		1,459,420	1,375,808
Correction of Prior Year Opening Balance		-	-
Balance Sheet Adjustment	6	12,947	-
Closing Balance: Surplus(Deficit)	7	1,240,960	1,459,420

Notes to the Statement of Financial Performance

- 1 2016 Category 1 income was \$1.5m
- 2 Faculty's 2016 CCRC contribution consist of a 12% increase from 2015
- 3 Sources of UNSW funding for 2016 included \$473K in SIR50 funds and \$184k from SIR70 funds
- 4 77% of the Centre's total 2016 expenditure was on people costs compared to 80% in 2015. In 2016, 46% of people costs came from base operating and strategic (SPF02, SIR50, SIR70) funds meaning that more than half of the centre's salaries and on-costs are supported by fellowships or research grants
- 5 In 2016, 73% was funded by external grants compared to 75% in 2015, 78% in 2014 and 80% in 2013
- 6 Foundation transfer recovering monies back into Foundation
- 7 Closing cash balance agreed to NS financial reports


 Urania Stamios CPA
 Science Faculty Finance Manager


 Date



Statement of in-kind contributions including academic and other salaries, infrastructure and other resources provided to the Centre

The Centre gratefully acknowledges support provided by UG student administrative staff in the Schools of BEES and Physics as well as assistance from the Science Student Centre, Faculty of Science Finance team, the Graduate Research School, Research Strategy Office and significant support from the Grants Management Office. We acknowledge also the invaluable expertise and support provided by the Faculty's IT staff from desktop support to assistance with major computational infrastructure. CCRC staff have also benefited from the work of the ARCCSS Computational Modelling Support (CMS) team whose work has saved many person-hours that used to be spent by students and staff in setting up and trouble-shooting climate model runs and managing data.

The CCRC occupies space on Level 4 of the Mathews Building that was purpose renovated for us to occupy in 2008. This space was slightly expanded in 2013 to accommodate the Centre's growth in student and post-doc numbers.

Management & Oversight

Until the end of 2012 CCRC stood as an autonomous staffing unit within the Faculty. From 2013 the CCRC became a centre situated within The School of Biological, Earth and Environmental Sciences (BEES), although remaining separately budgeted by the Faculty of Science

The CCRC is overseen by a Steering Committee chaired by Professor Chris Tinney (AD-R, Faculty of Science). The other members of the Committee are: Michael Ashley (Physics), Rob Brooks, (EERC/BEES), Mark Holzer (Mathematics and Statistics) and Richard Stuetz (WRC/Civil and Environmental Engineering).

The make-up of the committee is a reflection of the collaborative ties the Centre has with different Schools and Centres across UNSW. The Steering Committee primarily has a strategic advisory role.

Responsibility for day-to-day management and operation of the centre is shared between the Director, Centre Manager and staff with delegated portfolios (such as the PG Coordinator, IT coordinator, UG Coordinator, Honours Coordination, Marketing/outreach coordinator, etc). The centre leadership team works closely and cooperatively with the Faculty of Science executive group and faculty committees. The Centre Director meets regularly with the Head of School of BEES as the two organisations come together more closely through finding shared synergies and alignment of processes and roles. Bimonthly staff meetings are held to reflect UNSW's school governance structure of regular board meetings.

The CCRC's PhD and undergraduate programs are officially administered by BEES, but the centre manages its own finances, teaching development, administration and IT (including an investment of 0.5 EFT in the Faculty IT unit), as well as administration relating to postgraduate student applications, enrolment and scholarships and the formal postgraduate review process.

Appendix A – 2016 Publications

1. Abram, N.J., McGregor, H.V., Tierney, J.E., Evans, M.N., McKay, N.P., Kaufman, D.S., Thirumalai, K., Martrat, B., Goose, H., Phipps, S.J., Steig, E.J., Kilbourne, K.H., Saenger, C.P., Zinke, J., Leduc, G., Addison, J.A., Mortyn, P.G., Seidenkrantz, M.-S., Sicre, M.-A., Selvaraj, K., Filipsson, H.L., Neukom, R., Gergis, J., Curran, M.A.J., Gunten, L. von, 2016. Early onset of industrial-era warming across the oceans and continents. *Nature* 536, 411–418. doi:10.1038/nature19082
2. Ajami, H., sharma, A., Band, L.E., Evans, J.P., Tuteja, N.K., Amirthanathan, G.E., Bari, M.A., 2016. On the non-stationarity of hydrological response in anthropogenically unaffected catchments: An Australian perspective. *Hydrology and Earth System Sciences Discussions* 1–28. doi:10.5194/hess-2016-353
3. Alexander, L.V., 2016. Global observed long-term changes in temperature and precipitation extremes: A review of progress and limitations in IPCC assessments and beyond. *Weather and Climate Extremes* 11, 4–16. doi:10.1016/j.wace.2015.10.007
4. Angélil, O., Perkins-Kirkpatrick, S., Alexander, L.V., Stone, D., Donat, M.G., Wehner, M., Shiogama, H., Ciavarella, A., Christidis, N., 2016. Comparing regional precipitation and temperature extremes in climate model and reanalysis products. *Weather and Climate Extremes* 13, 35–43. doi:10.1016/j.wace.2016.07.001
5. Argüeso, D., Di Luca, A., Perkins-Kirkpatrick, S.E., Evans, J.P., 2016. Seasonal mean temperature changes control future heat waves: MEAN temperature and heat wave changes. *Geophysical Research Letters* 43, 7653–7660. doi:10.1002/2016GL069408
6. Barlow, M., Zaitchik, B., Paz, S., Black, E., Evans, J., Hoell, A., 2016. A Review of Drought in the Middle East and Southwest Asia. *Journal of Climate* 29, 8547–8574. doi:10.1175/JCLI-D-13-00692.1
7. Beaumont, L.J., Duursma, D., Kemp, D.J., Wilson, P.D., Evans, J.P., 2016. Potential impacts of a future persistent El Niño or La Niña on three subspecies of Australian butterflies. *Biotropica*. doi:10.1111/btp.12356
8. Bellon, G., Geoffroy, O., 2016a. Stratocumulus radiative effect, multiple equilibria of the well-mixed boundary layer and transition to shallow convection: Multiple Equilibria and Sc-to-Cu Transition. *Quarterly Journal of the Royal Meteorological Society* 142, 1685–1696. doi:10.1002/qj.2762
9. Bellon, G., Geoffroy, O., 2016b. How finely do we need to represent the stratocumulus radiative effect?: Spatial Structure of the Stratocumulus Radiative Effect. *Quarterly Journal of the Royal Meteorological Society* 142, 2347–2358. doi:10.1002/qj.2828
10. Berg, A., Findell, K., Lintner, B., Giannini, A., Seneviratne, S.I., van den Hurk, B., Lorenz, R., Pitman, A., Hagemann, S., Meier, A., Cheruy, F., Ducharne, A., Malyshev, S., Milly, P.C.D., 2016. Land–atmosphere feedbacks amplify aridity increase over land under global warming. *Nature Climate Change* 6, 869–874. doi:10.1038/nclimate3029
11. Birch, C.E., Webster, S., Peatman, S.C., Parker, D.J., Matthews, A.J., Li, Y., Hassim, M.E.E., 2016. Scale Interactions between the MJO and the Western Maritime Continent. *Journal of Climate* 29, 2471–2492. doi:10.1175/JCLI-D-15-0557.1
12. Blunden, J., Arndt, D.S., 2016. State of the Climate in 2015. *Bulletin of the American Meteorological Society* 97, Si-S275. doi:10.1175/2016BAMSStateoftheClimate.1

13. Bracegirdle, T.J., Bertler, N.A.N., Carleton, A.M., Ding, Q., Fogwill, C.J., Fyfe, J.C., Hellmer, H.H., Karpechko, A.Y., Kusahara, K., Larour, E., Mayewski, P.A., Meier, W.N., Polvani, L.M., Russell, J.L., Stevenson, S.L., Turner, J., van Wessem, J.M., van de Berg, W.J., Wainer, I., 2016. A Multidisciplinary Perspective on Climate Model Evaluation For Antarctica. *Bulletin of the American Meteorological Society* 97, ES23-ES26. doi:10.1175/BAMS-D-15-00108.1
14. Chafik, L., Häkkinen, S., England, M.H., Carton, J.A., Nigam, S., Ruiz-Barradas, A., Hannachi, A., Miller, L., 2016. Global linkages originating from decadal oceanic variability in the subpolar North Atlantic: ATLANTIC-PACIFIC CONNECTIVITY. *Geophysical Research Letters* 43, 10,909-10,919. doi:10.1002/2016GL071134
15. Chen, T., McVicar, T., Wang, G., Chen, X., de Jeu, R., Liu, Y., Shen, H., Zhang, F., Dolman, A., 2016a. Advantages of Using Microwave Satellite Soil Moisture over Gridded Precipitation Products and Land Surface Model Output in Assessing Regional Vegetation Water Availability and Growth Dynamics for a Lateral Inflow Receiving Landscape. *Remote Sensing* 8, 428. doi:10.3390/rs8050428
16. Chen, T., Wang, G., Yuan, W., Li, A., Liu, Y.Y., 2016b. Asymmetric NDVI trends of the two cropping seasons in the Huai River basin. *Remote Sensing Letters* 7, 61–70. doi:10.1080/2150704X.2015.1109156
17. Choudhury, D., Sen Gupta, A., Sharma, A., Taschetto, A.S., Mehrotra, R., Sivakumar, B., 2016a. Impacts of the tropical trans-basin variability on Australian rainfall. *Climate Dynamics*. doi:10.1007/s00382-016-3405-z
18. Choudhury, D., Sharma, A., Sen Gupta, A., Mehrotra, R., Sivakumar, B., 2016b. Sampling biases in CMIP5 decadal forecasts: Sampling Biases in CMIP5 Decadal Experiments. *Journal of Geophysical Research: Atmospheres* 121, 3435–3445. doi:10.1002/2016JD024804
19. Clarke, H., Pitman, A.J., Kala, J., Carouge, C., Haverd, V., Evans, J.P., 2016a. Erratum to: An investigation of future fuel load and fire weather in Australia. *Climatic Change*. doi:10.1007/s10584-016-1823-x
20. Clarke, H., Pitman, A.J., Kala, J., Carouge, C., Haverd, V., Evans, J.P., 2016b. An investigation of future fuel load and fire weather in Australia. *Climatic Change*. doi:10.1007/s10584-016-1808-9
21. Cook, B.I., Palmer, J.G., Cook, E.R., Turney, C.S.M., Allen, K., Fenwick, P., O'Donnell, A., Lough, J.M., Grierson, P.F., Ho, M., Baker, P.J., 2016. The paleoclimate context and future trajectory of extreme summer hydroclimate in eastern Australia: extreme hydroclimate in eastern Australia. *Journal of Geophysical Research: Atmospheres* 121, 12,820-12,838. doi:10.1002/2016JD024892
22. Cooper, A., Turney, C., Huguen, K., 2016. Response to Comment on “Abrupt warming events drove Late Pleistocene Holarctic megafaunal turnover.” *Science* 351, 927–927. doi:10.1126/science.aad8016
23. Di Luca, A., Argüeso, D., Evans, J.P., de Elía, R., Laprise, R., 2016. Quantifying the overall added value of dynamical downscaling and the contribution from different spatial scales: OVERALL ADDED VALUE OF RCMS. *Journal of Geophysical Research: Atmospheres* 121, 1575–1590. doi:10.1002/2015JD024009
24. Di Luca, A., Evans, J.P., Pepler, A., Alexander, L.V., Argüeso, D., 2016. Evaluating the representation of Australian East Coast Lows in a regional climate model ensemble. *JOURNAL OF SOUTHERN HEMISPHERE EARTH SYSTEMS SCIENCE* 2016, 108–124.
25. Dittus, A.J., Karoly, D.J., Lewis, S.C., Alexander, L.V., Donat, M.G., 2016. A Multiregion Model Evaluation and Attribution Study of Historical Changes in the Area Affected by Temperature and Precipitation Extremes. *Journal of Climate* 29, 8285–8299. doi:10.1175/JCLI-D-16-0164.1
26. Donat, M.G., Alexander, L.V., Herold, N., Dittus, A.J., 2016a. Temperature and precipitation extremes in century-long gridded observations, reanalyses, and atmospheric model simulations: EXTREMES IN CENTURY-LONG DATA SETS. *Journal of Geophysical Research: Atmospheres* 121, 11,174-11,189. doi:10.1002/2016JD025480
27. Donat, M.G., Lowry, A.L., Alexander, L.V., O’Gorman, P.A., Maher, N., 2016b. More extreme precipitation in the world’s dry and wet regions. *Nature Climate Change* 6, 508–513. doi:10.1038/nclimate2941
28. Evans, J.P., Argüeso, D., Olson, R., Di Luca, A., 2016a. Bias-corrected regional climate projections of extreme rainfall in south-east Australia. *Theoretical and Applied Climatology*. doi:10.1007/s00704-016-1949-9

29. Evans, J.P., Meng, X., McCabe, M.F., 2016b. Land surface albedo and vegetation feedbacks enhanced the Millennium drought in south-east Australia. *Hydrology and Earth System Sciences Discussions* 1–22. doi:10.5194/hess-2016-439
30. Fita, L., Evans, J.P., Argüeso, D., King, A., Liu, Y., 2016. Evaluation of the regional climate response in Australia to large-scale climate modes in the historical NARCLIM simulations. *Climate Dynamics*. doi:10.1007/s00382-016-3484-x
31. Flaounas, E., Di Luca, A., Drobinski, P., Mailler, S., Arsouze, T., Bastin, S., Beranger, K., Lebeaupin Brossier, C., 2016. Cyclone contribution to the Mediterranean Sea water budget. *Climate Dynamics* 46, 913–927. doi:10.1007/s00382-015-2622-1
32. Fogwill, C.J., 2016. The transformation of organic carbon during river-groundwater exchange: An example from the Murray-Darling Basin. Presented at the AGU, San Francisco.
33. Fogwill, C.J., van Sebille, E., Cougnon, E.A., Turney, C.S.M., Rintoul, S.R., Clark, G.F., Marzinelli, E.M., Rainsley, E.B., Carter, L., 2016a. Brief Communication: Evidence of a developing Polynya off Commonwealth Bay, East Antarctica, triggered by grounding of iceberg. *The Cryosphere Discussions* 1–13. doi:10.5194/tc-2016-19
34. Fogwill, C.J., van Sebille, E., Cougnon, E.A., Turney, C.S.M., Rintoul, S.R., Galton-Fenzi, B.K., Clark, G.F., Marzinelli, E.M., Rainsley, E.B., Carter, L., 2016b. Brief communication: Impacts of a developing polynya off Commonwealth Bay, East Antarctica, triggered by grounding of iceberg B09B. *The Cryosphere* 10, 2603–2609. doi:10.5194/tc-10-2603-2016
35. Fogwill, C.J., van Sebille, E., Cougnon, E.A., Turney, C.S.M., Rintoul, S.R., Galton-Fenzi, B.K., Clark, G.F., Marzinelli, E.M., Rainsley, E.B., Carter, L., 2016c. Brief communication: Impacts of a developing polynya off Commonwealth Bay, East Antarctica, triggered by grounding of iceberg B09B. *The Cryosphere* 10, 2603–2609. doi:10.5194/tc-10-2603-2016
36. Fuchs, D., Sherwood, S., 2016. Practical Approximations to Seasonal Fluctuation–Dissipation Operators Given a Limited Sample. *Journal of the Atmospheric Sciences* 73, 2529–2545. doi:10.1175/JAS-D-15-0279.1
37. Gibson, P.B., Perkins-Kirkpatrick, S.E., Renwick, J.A., 2016a. Projected changes in synoptic weather patterns over New Zealand examined through self-organizing maps: PROJECTED CHANGES IN SYNOPTIC WEATHER PATTERNS OVER NEW ZEALAND. *International Journal of Climatology* 36, 3934–3948. doi:10.1002/joc.4604
38. Gibson, P.B., Uotila, P., Perkins-Kirkpatrick, S.E., Alexander, L.V., Pitman, A.J., 2016b. Evaluating synoptic systems in the CMIP5 climate models over the Australian region. *Climate Dynamics* 47, 2235–2251. doi:10.1007/s00382-015-2961-y
39. Gimeno, L., Dominguez, F., Nieto, R., Trigo, R., Drumond, A., Reason, C.J.C., Taschetto, A.S., Ramos, A.M., Kumar, R., Marengo, J., 2016. Major Mechanisms of Atmospheric Moisture Transport and Their Role in Extreme Precipitation Events. *Annual Review of Environment and Resources* 41, 117–141. doi:10.1146/annurev-environ-110615-085558
40. Golledge, N.R., Thomas, Z.A., Levy, R.H., Gasson, E.G.W., Naish, T.R., McKay, R.M., Kowalewski, D.E., Fogwill, C.J., 2016. Antarctic climate and ice sheet configuration during a peak-warmth Early Pliocene interglacial. *Climate of the Past Discussions* 1–27. doi:10.5194/cp-2016-123
41. Green, D., 2016. The spatial distribution of extreme climate events, another climate inequity for the world's most vulnerable people. *Environmental Research Letters* 11, 091002. doi:10.1088/1748-9326/11/9/091002
42. Green, D., Martin, D., 2016. Maintaining the Healthy Country–Healthy People Nexus through Sociocultural and Environmental Transformations: challenges for the Wik Aboriginal people of Aurukun, Australia. *Australian Geographer* 1–25. doi:10.1080/00049182.2016.1220898
43. Gross, M.H., Alexander, L.V., Macadam, I., Green, D., Evans, J.P., 2016. The representation of health-relevant heatwave characteristics in a Regional Climate Model ensemble for New South Wales and the Australian Capital Territory, Australia: REPRESENTING HEATWAVES USING REGIONAL CLIMATE MODEL DATA. *International Journal of Climatology*. doi:10.1002/joc.4769
44. Harrington, L.J., Gibson, P.B., Dean, S.M., Mitchell, D., Rosier, S.M., Frame, D.J., 2016. Investigating event-specific drought attribution using self-organizing maps: DROUGHT

- ATTRIBUTION USING SOMS. *Journal of Geophysical Research: Atmospheres* 121, 12,766–12,780. doi:10.1002/2016JD025602
45. Hernandez-Deckers, D., Sherwood, S.C., 2016. A Numerical Investigation of Cumulus Thermals. *Journal of the Atmospheric Sciences* 73, 4117–4136. doi:10.1175/JAS-D-15-0385.1
46. Herold, N., Alexander, L.V., Donat, M.G., Contractor, S., Becker, A., 2016. How much does it rain over land?: HOW MUCH DOES IT RAIN? *Geophysical Research Letters* 43, 341–348. doi:10.1002/2015GL066615
47. Herold, N., Kala, J., Alexander, L.V., 2016. The influence of soil moisture deficits on Australian heatwaves. *Environmental Research Letters* 11, 064003. doi:10.1088/1748-9326/11/6/064003
48. Heyrana, K.J., Goh, B.C., Perilla, J.R., Nguyen, T.-L.N., England, M.R., Bewley, M.C., Schulten, K., Craven, R.C., 2016. Contributions of Charged Residues in Structurally Dynamic Capsid Surface Loops to Rous Sarcoma Virus Assembly. *Journal of Virology* 90, 5700–5714. doi:10.1128/JVI.00378-16
49. Hirsch, A.L., Pitman, A.J., Haverd, V., 2016. Evaluating Land–Atmosphere Coupling Using a Resistance Pathway Framework. *Journal of Hydrometeorology* 17, 2615–2630. doi:10.1175/JHM-D-15-0204.1
50. Hobday, A.J., Alexander, L.V., Perkins, S.E., Smale, D.A., Straub, S.C., Oliver, E.C.J., Benthuyssen, J.A., Burrows, M.T., Donat, M.G., Feng, M., Holbrook, N.J., Moore, P.J., Scannell, H.A., Sen Gupta, A., Wernberg, T., 2016. A hierarchical approach to defining marine heatwaves. *Progress in Oceanography* 141, 227–238. doi:http://dx.doi.org/10.1016/j.pocean.2015.12.014
51. Hogg, A., Southon, J., Turney, C., Palmer, J., Bronk Ramsey, C., Fenwick, P., Boswijk, G., Friedrich, M., Helle, G., Huguen, K., Jones, R., Kromer, B., Noronha, A., Reynard, L., Staff, R., Wacker, L., 2016a. Punctuated Shutdown of Atlantic Meridional Overturning Circulation during Greenland Stadial 1. *Scientific Reports* 6, 25902. doi:10.1038/srep25902
52. Hogg, A., Southon, J., Turney, C., Palmer, J., Ramsey, C.B., Fenwick, P., Boswijk, G., Büntgen, U., Friedrich, M., Helle, G., Huguen, K., Jones, R., Kromer, B., Noronha, A., Reinig, F., Reynard, L., Staff, R., Wacker, L., 2016b. Decadally Resolved Lateglacial Radiocarbon Evidence from New Zealand Kauri. *Radiocarbon* 58, 709–733. doi:10.1017/RDC.2016.86
53. Holgate, C., De Jeu, R.A.M., van Dijk, A.I.J., Liu, Y., Renzullo, L.J., Vinodkumar, Dharssi, I., Parinussa, R.M., Van Der Schalie, R., Gevaert, A., Walker, J., McJannet, D., Cleverly, J., Haverd, V., Trudinger, C.M., Briggs, P.R., 2016. Comparison of remotely sensed and modelled soil moisture data sets across Australia. *Remote Sensing of Environment* 186, 479–500. doi:10.1016/j.rse.2016.09.015
54. Ji, F., Evans, J., Teng, J., Scorgie, Y., Argüeso, D., Di Luca, A., 2016. Evaluation of long-term precipitation and temperature Weather Research and Forecasting simulations for southeast Australia. *Climate Research* 67, 99–115. doi:10.3354/cr01366
55. Jiang, N., Scorgie, Y., Hart, M., Riley, M.L., Crawford, J., Beggs, P.J., Edwards, G.C., Chang, L., Salter, D., Virgilio, G.D., 2016. Visualising the relationships between synoptic circulation type and air quality in Sydney, a subtropical coastal-basin environment: SYNOPTIC CIRCULATION TYPE AND AIR QUALITY IN SYDNEY. *International Journal of Climatology*. doi:10.1002/joc.4770
56. Johnson, C.N., Alroy, J., Beeton, N.J., Bird, M.I., Brook, B.W., Cooper, A., Gillespie, R., Herrando-Pérez, S., Jacobs, Z., Miller, G.H., Prideaux, G.J., Roberts, R.G., Rodríguez-Rey, M., Saltré, F., Turney, C.S.M., Bradshaw, C.J.A., 2016. What caused extinction of the Pleistocene megafauna of Sahul? *Proceedings of the Royal Society B: Biological Sciences* 283, 20152399. doi:10.1098/rspb.2015.2399
57. Johnson, F., White, C.J., van Dijk, A., Ekstrom, M., Evans, J.P., Jakob, D., Kiem, A.S., Leonard, M., Rouillard, A., Westra, S., 2016. Natural hazards in Australia: floods. *Climatic Change* 139, 21–35. doi:10.1007/s10584-016-1689-y
58. Jones, J.M., Gille, S.T., Goosse, H., Abram, N.J., Canziani, P.O., Charman, D.J., Clem, K.R., Crosta, X., de Lavergne, C., Eisenman, I., England, M.H., Fogt, R.L., Frankcombe, L.M., Marshall, G.J., Masson-Delmotte, V., Morrison, A.K., Orsi, A.J., Raphael, M.N., Renwick, J.A., Schneider, D.P., Simpkins, G.R., Steig, E.J., Stenni, B., Swingedouw, D., Vance, T.R., 2016. Assessing recent trends in high-latitude Southern Hemisphere surface climate. *Nature*

Climate Change 6, 917–926.

doi:10.1038/nclimate3103

59. Jourdain, N.C., Lengaigne, M., Vialard, J., Izumo, T., Gupta, A.S., 2016. Further Insights on the Influence of the Indian Ocean Dipole on the Following Year's ENSO from Observations and CMIP5 Models. *Journal of Climate* 29, 637–658. doi:10.1175/JCLI-D-15-0481.1
60. Kajtar, J.B., Santoso, A., England, M.H., Cai, W., 2016. Tropical climate variability: interactions across the Pacific, Indian, and Atlantic Oceans. *Climate Dynamics*. doi:10.1007/s00382-016-3199-z
61. Kala, J., De Kauwe, M.G., Pitman, A.J., Medlyn, B.E., Wang, Y.-P., Lorenz, R., Perkins-Kirkpatrick, S.E., 2016. Impact of the representation of stomatal conductance on model projections of heatwave intensity. *Scientific Reports* 6, 23418. doi:10.1038/srep23418
62. Kiem, A.S., Johnson, F., Westra, S., van Dijk, A., Evans, J.P., O'Donnell, A., Rouillard, A., Barr, C., Tyler, J., Thyer, M., Jakob, D., Woldemeskel, F., Sivakumar, B., Mehrotra, R., 2016. Natural hazards in Australia: droughts. *Climatic Change* 139, 37–54. doi:10.1007/s10584-016-1798-7
63. Kiss, A.E., Frankcombe, L.M., 2016. The Influence of Periodic Forcing on the Time Dependence of Western Boundary Currents: Phase Locking, Chaos, and Mechanisms of Low-Frequency Variability*. *Journal of Physical Oceanography* 46, 1117–1136. doi:10.1175/JPO-D-15-0113.1
64. Li, J., Sharma, A., Evans, J., Johnson, F., 2016. Addressing the mischaracterization of extreme rainfall in regional climate model simulations – A synoptic pattern based bias correction approach. *Journal of Hydrology*. doi:10.1016/j.jhydrol.2016.04.070
65. Li, Y., Jourdain, N.C., Taschetto, A.S., Gupta, A.S., Argüeso, D., Masson, S., Cai, W., 2016. Resolution dependence of the simulated precipitation and diurnal cycle over the Maritime Continent. *Climate Dynamics*. doi:10.1007/s00382-016-3317-y
66. Lipson, M.J., Hart, M.A., Thatcher, M., 2016. Efficiently modelling urban heat storage: an interface conduction scheme in the aTEB urban land surface model. *Geoscientific Model Development Discussions* 1–28. doi:10.5194/gmd-2016-240
67. Lorenz, R., Argüeso, D., Donat, M.G., Pitman, A.J., van den Hurk, B., Berg, A., Lawrence, D.M., Chéruy, F., Ducharne, A., Hagemann, S., Meier, A., Milly, P.C.D., Seneviratne, S.I., 2016. Influence of land-atmosphere feedbacks on temperature and precipitation extremes in the GLACE-CMIP5 ensemble: CLIMATE EXTREMES IN GLACE-CMIP5. *Journal of Geophysical Research: Atmospheres* 121, 607–623. doi:10.1002/2015JD024053
68. Lorenz, R., Pitman, A.J., Sisson, S.A., 2016. Does Amazonian deforestation cause global effects; can we be sure?: AMAZONIAN DEFORESTATION. *Journal of Geophysical Research: Atmospheres* 121, 5567–5584. doi:10.1002/2015JD024357
69. Loughran, T.F., Perkins-Kirkpatrick, S.E., Alexander, L.V., 2016. Understanding the spatio-temporal influence of climate variability on Australian heatwaves: VARIABILITY OF AUSTRALIAN HEATWAVES. *International Journal of Climatology*. doi:10.1002/joc.4971
70. Ma, S., Churkina, G., Gessler, A., Wieland, R., Bellocchi, G., 2016. Yield gap of winter wheat in Europe and sensitivity of potential yield to climate factors. *Climate Research* 67, 179–190. doi:10.3354/cr01367
71. Ma, S., Pitman, A.J., Lorenz, R., Kala, J., Srbinovsky, J., 2016a. Earlier green-up and spring warming amplification over Europe: Warming Effects of Earlier Green-Up. *Geophysical Research Letters* 43, 2011–2018. doi:10.1002/2016GL068062
72. Ma, S., Pitman, A.J., Lorenz, R., Kala, J., Srbinovsky, J., 2016b. Earlier green-up and spring warming amplification over Europe: Warming Effects of Earlier Green-Up. *Geophysical Research Letters* 43, 2011–2018. doi:10.1002/2016GL068062
73. Macadam, I., Argüeso, D., Evans, J.P., Liu, D.L., Pitman, A.J., 2016. The effect of bias correction and climate model resolution on wheat simulations forced with a regional climate model ensemble: FORCING WHEAT SIMULATIONS WITH REGIONAL CLIMATE MODEL DATA. *International Journal of Climatology* n/a–n/a. doi:10.1002/joc.4653
74. Maher, P., Sherwood, S.C., 2016. Skill in Simulating Australian Precipitation at the Tropical Edge. *Journal of Climate* 29, 1477–1496. doi:10.1175/JCLI-D-15-0548.1

75. Maher, W., Maher, N., Taylor, A., Krikowa, F., Ubrihien, R., Mikac, K.M., 2016. The use of the marine gastropod, *Cellana tramoserica*, as a biomonitor of metal contamination in near shore environments. *Environmental Monitoring and Assessment* 188. doi:10.1007/s10661-016-5380-6
76. McNeil, B.I., Sasse, T.P., 2016. Future ocean hypercapnia driven by anthropogenic amplification of the natural CO₂ cycle. *Nature* 529, 383–386. doi:10.1038/nature16156
77. Metcalf, J.L., Turney, C., Barnett, R., Martin, F., Bray, S.C., Vilstrup, J.T., Orlando, L., Salas-Gismondi, R., Loponte, D., Medina, M., De Nigris, M., Civalero, T., Fernandez, P.M., Gasco, A., Duran, V., Seymour, K.L., Otaola, C., Gil, A., Paunero, R., Prevosti, F.J., Bradshaw, C.J.A., Wheeler, J.C., Borrero, L., Austin, J.J., Cooper, A., 2016. Synergistic roles of climate warming and human occupation in Patagonian megafaunal extinctions during the Last Deglaciation. *Science Advances* 2, e1501682–e1501682. doi:10.1126/sciadv.1501682
78. Miralles, D.G., Nieto, R., McDowell, N.G., Dorigo, W.A., Verhoest, N.E., Liu, Y.Y., Teuling, A.J., Dolman, A.J., Good, S.P., Gimeno, L., 2016. Contribution of water-limited ecoregions to their own supply of rainfall. *Environmental Research Letters* 11, 124007. doi:10.1088/1748-9326/11/12/124007
79. Moalafhi, D.B., Evans, J.P., Sharma, A., 2016a. Influence of reanalysis datasets on dynamically downscaling the recent past. *Climate Dynamics*. doi:10.1007/s00382-016-3378-y
80. Moalafhi, D.B., Evans, J.P., Sharma, A., 2016b. Evaluating global reanalysis datasets for provision of boundary conditions in regional climate modelling. *Climate Dynamics* 47, 2727–2745. doi:10.1007/s00382-016-2994-x
81. Murray-Tortarolo, G., Friedlingstein, P., Sitch, S., Jaramillo, V.J., Murguía-Flores, F., Anav, A., Liu, Y., Arneth, A., Arvanitis, A., Harper, A., Jain, A., Kato, E., Koven, C., Poulter, B., Stocker, B.D., Wiltshire, A., Zaehle, S., Zeng, N., 2016. The carbon cycle in Mexico: past, present and future of C stocks and fluxes. *Biogeosciences* 13, 223–238. doi:10.5194/bg-13-223-2016
82. Murray-Tortarolo, G., Friedlingstein, P., Sitch, S., Seneviratne, S.I., Fletcher, I., Mueller, B., Greve, P., Anav, A., Liu, Y., Ahlström, A., Huntingford, C., Levis, S., Levy, P., Lomas, M., Poulter, B., Viovy, N., Zaehle, S., Zeng, N., 2016. The dry season intensity as a key driver of NPP trends: Dry Season and Vegetation Productivity. *Geophysical Research Letters* 43, 2632–2639. doi:10.1002/2016GL068240
83. Nishant, N., Sherwood, S.C., Geoffroy, O., 2016. Radiative driving of shallow return flows from the ITCZ: RADIATIVE DRIVING OF SHALLOW FLOWS. *Journal of Advances in Modeling Earth Systems* 8, 831–842. doi:10.1002/2015MS000606
84. Olson, R., Evans, J., Di Luca, A., Argüeso, D., 2016. The NARClIM project: model agreement and significance of climate projections. *Climate Research* 69, 209–227. doi:10.3354/cr01403
85. Olson, R., Fan, Y., Evans, J.P., 2016. A simple method for Bayesian model averaging of regional climate model projections: Application to southeast Australian temperatures: BMA OF REGIONAL CLIMATE PROJECTIONS. *Geophysical Research Letters* 43, 7661–7669. doi:10.1002/2016GL069704
86. Palmer, J.G., Turney, C.S.M., Cook, E.R., Fenwick, P., Thomas, Z., Helle, G., Jones, R., Clement, A., Hogg, A., Southon, J., Bronk Ramsey, C., Staff, R., Muscheler, R., Corrège, T., Hua, Q., 2016. Changes in El Niño – Southern Oscillation (ENSO) conditions during the Greenland Stadial 1 (GS-1) chronozone revealed by New Zealand tree-rings. *Quaternary Science Reviews* 153, 139–155. doi:10.1016/j.quascirev.2016.10.003
87. Pepler, A.S., Alexander, L.V., Evans, J.P., Sherwood, S.C., 2016a. Zonal winds and southeast Australian rainfall in global and regional climate models. *Climate Dynamics* 46, 123–133. doi:10.1007/s00382-015-2573-6
88. Pepler, A.S., Alexander, L.V., Evans, J.P., Sherwood, S.C., 2016b. The influence of local sea surface temperatures on Australian east coast cyclones: SSTs AND AUSTRALIAN EAST COAST CYCLONES. *Journal of Geophysical Research: Atmospheres* 121, 13,352–13,363. doi:10.1002/2016JD025495
89. Pepler, A.S., Di Luca, A., Ji, F., Alexander, L.V., Evans, J.P., Sherwood, S.C., 2016c. Projected changes in east Australian midlatitude cyclones during the 21st century: Future Midlatitude Cyclones in Australia. *Geophysical Research Letters* 43, 334–340. doi:10.1002/2015GL067267

90. Pepler, A.S., Fong, J., Alexander, L.V., 2016d. Australian east coast mid-latitude cyclones in the 20th Century Reanalysis ensemble: AUSTRALIAN EAST COAST CYCLONES IN THE 20TH CENTURY REANALYSIS. *International Journal of Climatology*. doi:10.1002/joc.4812
91. Perkins-Kirkpatrick, S.E., White, C.J., Alexander, L.V., Argüeso, D., Boschat, G., Cowan, T., Evans, J.P., Ekström, M., Oliver, E.C.J., Phatak, A., Purich, A., 2016. Natural hazards in Australia: heatwaves. *Climatic Change*. doi:10.1007/s10584-016-1650-0
92. Phipps, S.J., Fogwill, C.J., Turney, C.S.M., 2016. Impacts of marine instability across the East Antarctic Ice Sheet on Southern Ocean dynamics. *The Cryosphere Discussions* 1–16. doi:10.5194/tc-2016-111
93. Pitman, A.J., Lorenz, R., 2016. Scale dependence of the simulated impact of Amazonian deforestation on regional climate. *Environmental Research Letters* 11, 094025. doi:10.1088/1748-9326/11/9/094025
94. Pontes, G.M., Sen Gupta, A., Taschetto, A.S., 2016. Projected changes to South Atlantic boundary currents and confluence region in the CMIP5 models: the role of wind and deep ocean changes. *Environmental Research Letters* 11, 094013. doi:10.1088/1748-9326/11/9/094013
95. Purich, A., Cai, W., England, M.H., Cowan, T., 2016a. Evidence for link between modelled trends in Antarctic sea ice and underestimated westerly wind changes. *Nature Communications* 7, 10409. doi:10.1038/ncomms10409
96. Purich, A., England, M.H., Cai, W., Chikamoto, Y., Timmermann, A., Fyfe, J.C., Frankcombe, L., Meehl, G.A., Arblaster, J.M., 2016b. Tropical Pacific SST Drivers of Recent Antarctic Sea Ice Trends. *Journal of Climate* 29, 8931–8948. doi:10.1175/JCLI-D-16-0440.1
97. Putnam, A.E., Putnam, D.E., Andreu-Hayles, L., Cook, E.R., Palmer, J.G., Clark, E.H., Wang, C., Chen, F., Denton, G.H., Boyle, D.P., Bassett, S.D., Birkel, S.D., Martin-Fernandez, J., Hajdas, I., Southon, J., Garner, C.B., Cheng, H., Broecker, W.S., 2016. Little Ice Age wetting of interior Asian deserts and the rise of the Mongol Empire. *Quaternary Science Reviews* 131, 33–50. doi:10.1016/j.quascirev.2015.10.033
98. Qin, X., Menviel, L., Sen Gupta, A., van Sebille, E., 2016. Iron sources and pathways into the Pacific Equatorial Undercurrent: EUC Iron Sources and Pathways. *Geophysical Research Letters* 43, 9843–9851. doi:10.1002/2016GL070501
99. Rodríguez-Rey, M., Herrando-Pérez, S., Brook, B.W., Saltré, F., Alroy, J., Beeton, N., Bird, M.I., Cooper, A., Gillespie, R., Jacobs, Z., Johnson, C.N., Miller, G.H., Prideaux, G.J., Roberts, R.G., Turney, C.S.M., Bradshaw, C.J.A., 2016. A comprehensive database of quality-rated fossil ages for Sahul's Quaternary vertebrates. *Scientific Data* 3, 160053. doi:10.1038/sdata.2016.53
100. Rouillard, A., Greenwood, P.F., Grice, K., Skrzypek, G., Dogramaci, S., Turney, C., Grierson, P.F., 2016. Interpreting vegetation change in tropical arid ecosystems from sediment molecular fossils and their stable isotope compositions: A baseline study from the Pilbara region of northwest Australia. *Palaeogeography, Palaeoclimatology, Palaeoecology* 459, 495–507. doi:10.1016/j.palaeo.2016.07.023
101. Rouillard, A., Skrzypek, G., Turney, C., Dogramaci, S., Hua, Q., Zawadzki, A., Reeves, J., Greenwood, P., O'Donnell, A.J., Grierson, P.F., 2016. Evidence for extreme floods in arid subtropical northwest Australia during the Little Ice Age chronozone (CE 1400–1850). *Quaternary Science Reviews* 144, 107–122. doi:10.1016/j.quascirev.2016.05.004
102. Saenko, O.A., Fyfe, J.C., Swart, N.C., Lee, W.G., England, M.H., 2016. Influence of tropical wind on global temperature from months to decades. *Climate Dynamics* 47, 2193–2203. doi:10.1007/s00382-015-2958-6
103. Sen Gupta, A., McGregor, S., van Sebille, E., Ganachaud, A., Brown, J.N., Santoso, A., 2016. Future changes to the Indonesian Throughflow and Pacific circulation: The differing role of wind and deep circulation changes: Pacific Circulation Projections. *Geophysical Research Letters* 43, 1669–1678. doi:10.1002/2016GL067757
104. Seneviratne, S.I., Donat, M.G., Pitman, A.J., Knutti, R., Wilby, R.L., 2016. Allowable CO2 emissions based on regional and impact-related climate targets. *Nature* 529, 477–483. doi:10.1038/nature16542
105. Sharples, J.J., Cary, G.J., Fox-Hughes, P., Mooney, S., Evans, J.P., Fletcher, M.-S., Fromm, M., Grierson, P.F., McRae, R., Baker, P., 2016. Natural hazards in Australia: extreme

- bushfire. *Climatic Change* 139, 85–99. doi:10.1007/s10584-016-1811-1
106. Sijp, W.P., England, M.H., 2016. The effect of low ancient greenhouse climate temperature gradients on the ocean's overturning circulation. *Climate of the Past* 12, 543–552. doi:10.5194/cp-12-543-2016
107. Simpson, C.C., Sharples, J.J., Evans, J.P., 2016. Sensitivity of atypical lateral fire spread to wind and slope: SENSITIVITY OF LATERAL SPREAD TO WIND AND SLOPE. *Geophysical Research Letters* 43, 1744–1751. doi:10.1002/2015GL067343
108. Stevens, B., Sherwood, S.C., Bony, S., Webb, M.J., 2016. Prospects for narrowing bounds on Earth's equilibrium climate sensitivity: EARTH'S EQUILIBRIUM CLIMATE SENSITIVITY. *Earth's Future* 4, 512–522. doi:10.1002/2016EF000376
109. Stockhecke, M., Timmermann, A., Kipfer, R., Haug, G.H., Kwiecien, O., Friedrich, T., Menviel, L., Litt, T., Pickarski, N., Anselmetti, F.S., 2016a. Millennial to orbital-scale variations of drought intensity in the Eastern Mediterranean. *Quaternary Science Reviews* 133, 77–95. doi:10.1016/j.quascirev.2015.12.016
110. Stockhecke, M., Timmermann, A., Kipfer, R., Haug, G.H., Kwiecien, O., Friedrich, T., Menviel, L., Litt, T., Pickarski, N., Anselmetti, F.S., 2016b. Corrigendum to “Millennial to orbital-scale variations of drought intensity in the Eastern Mediterranean” [Quat. Sci. Rev. 133 (2016) 77–95]. *Quaternary Science Reviews* 150, 312–314. doi:10.1016/j.quascirev.2016.07.019
111. Sullivan, M., Green, D., 2016. Misled about lead: an assessment of online public health education material from Australia's lead mining and smelting towns. *Environmental Health* 15, 1–12. doi:10.1186/s12940-015-0085-9
112. Taschetto, A.S., Gupta, A.S., Ummenhofer, C.C., England, M.H., 2016. Can Australian Multiyear Droughts and Wet Spells Be Generated in the Absence of Oceanic Variability? *Journal of Climate* 29, 6201–6221. doi:10.1175/JCLI-D-15-0694.1
113. Taschetto, A.S., Rodrigues, R.R., Meehl, G.A., McGregor, S., England, M.H., 2016. How sensitive are the Pacific–tropical North Atlantic teleconnections to the position and intensity of El Niño-related warming? *Climate Dynamics* 46, 1841–1860. doi:10.1007/s00382-015-2679-x
114. Thomas, Z.A., 2016. Using natural archives to detect climate and environmental tipping points in the Earth System. *Quaternary Science Reviews* 152, 60–71. doi:10.1016/j.quascirev.2016.09.026
115. Thorne, P.W., Donat, M.G., Dunn, R.J.H., Williams, C.N., Alexander, L.V., Caesar, J., Durre, I., Harris, I., Hausfather, Z., Jones, P.D., Menne, M.J., Rohde, R., Vose, R.S., Davy, R., Klein-Tank, A.M.G., Lawrimore, J.H., Peterson, T.C., Rennie, J.J., 2016. Reassessing changes in diurnal temperature range: Intercomparison and evaluation of existing global data set estimates: DTR Data Set Intercomparison/Assessment. *Journal of Geophysical Research: Atmospheres* 121, 5138–5158. doi:10.1002/2015JD024584
116. Tian, F., Brandt, M., Liu, Y.Y., Rasmussen, K., Fensholt, R., 2016a. Mapping gains and losses in woody vegetation across global tropical drylands. *Global Change Biology*. doi:10.1111/gcb.13464
117. Tian, F., Brandt, M., Liu, Y.Y., Verger, A., Tagesson, T., Diouf, A.A., Rasmussen, K., Mbow, C., Wang, Y., Fensholt, R., 2016b. Remote sensing of vegetation dynamics in drylands: Evaluating vegetation optical depth (VOD) using AVHRR NDVI and in situ green biomass data over West African Sahel. *Remote Sensing of Environment* 177, 265–276. doi:10.1016/j.rse.2016.02.056
118. Tong, S., Berry, H.L., Ebi, K., Bambrick, H., Hu, W., Green, D., Hanna, E., Wang, Z., Butler, C.D., 2016. Climate change, food, water and population health in China. *Bulletin of the World Health Organization* 94, 759–765. doi:10.2471/BLT.15.167031
119. Turney, C.S.M., Fogwill, C.J., Palmer, J.G., van Seville, E., Thomas, Z., McGlone, M., Richardson, S., Wilmshurst, J.M., Fenwick, P., Zunz, V., Goosse, H., Wilson, K.-J., Carter, L., Lipson, M., Jones, R.T., Harsch, M., Clark, G., Marzinelli, E., Rogers, T., Rainsley, E., Ciasto, L., Waterman, S., Thomas, E.R., Visbeck, M., 2016. Tropical forcing of increased Southern Ocean climate variability revealed by a 140-year subantarctic temperate reconstruction. *Climate of the Past Discussions* 1–24. doi:10.5194/cp-2016-114

120. Turney, C.S.M., Jones, R.T., Fogwill, C., Hatton, J., Williams, A.N., Hogg, A., Thomas, Z.A., Palmer, J., Mooney, S., Reimer, R.W., 2016. A 250-year periodicity in Southern Hemisphere westerly winds over the last 2600 years. *Climate of the Past* 12, 189–200. doi:10.5194/cp-12-189-2016
121. Turney, C.S.M., Jones, R.T., Lister, D., Jones, P., Williams, A.N., Hogg, A., Thomas, Z.A., Compo, G.P., Yin, X., Fogwill, C.J., Palmer, J., Colwell, S., Allan, R., Visbeck, M., 2016. Anomalous mid-twentieth century atmospheric circulation change over the South Atlantic compared to the last 6000 years. *Environmental Research Letters* 11, 064009. doi:10.1088/1748-9326/11/6/064009
122. Turney, C.S.M., Jones, R.T., Thomas, Z.A., Palmer, J.G., Brown, D., 2016. Extreme wet conditions coincident with Bronze Age abandonment of upland areas in Britain. *Anthropocene*. doi:10.1016/j.ancene.2016.02.002
123. Turney, C.S.M., McGlone, M., Palmer, J., Fogwill, C., Hogg, A., Thomas, Z.A., Lipson, M., Wilmshurst, J.M., Fenwick, P., Jones, R.T., Hines, B., Clark, G.F., 2016. Intensification of Southern Hemisphere westerly winds 2000–1000 years ago: evidence from the subantarctic Campbell and Auckland Islands (52–50°S): HOLOCENE SOUTHERN HEMISPHERE WESTERLY AIRFLOW, SW PACIFIC. *Journal of Quaternary Science* 31, 12–19. doi:10.1002/jqs.2828
124. Turney, C.S.M., Palmer, J., Bronk Ramsey, C., Adolphi, F., Muscheler, R., Hughen, K.A., Staff, R.A., Jones, R.T., Thomas, Z.A., Fogwill, C.J., Hogg, A., 2016. High-precision dating and correlation of ice, marine and terrestrial sequences spanning Heinrich Event 3: Testing mechanisms of interhemispheric change using New Zealand ancient kauri (*Agathis australis*). *Quaternary Science Reviews* 137, 126–134. doi:10.1016/j.quascirev.2016.02.005
125. Turney, C.S.M., Palmer, J., Hogg, A., Fogwill, C.J., Jones, R.T., Bronk Ramsey, C., Fenwick, P., Grierson, P., Wilmshurst, J., O'Donnell, A., Thomas, Z.A., Lipson, M., 2016. Multidecadal variations in Southern Hemisphere atmospheric 14 C: Evidence against a Southern Ocean sink at the end of the Little Ice Age CO₂ anomaly: SOUTHERN OCEAN VENTILATION DURING LIA. *Global Biogeochemical Cycles* 30, 211–218. doi:10.1002/2015GB005257
126. Ukkola, A.M., Pitman, A.J., Decker, M., De Kauwe, M.G., Abramowitz, G., Kala, J., Wang, Y.-P., 2016. Modelling evapotranspiration during precipitation deficits: identifying critical processes in a land surface model. *Hydrology and Earth System Sciences* 20, 2403–2419. doi:10.5194/hess-20-2403-2016
127. van Marle, M.J.E., van der Werf, G.R., de Jeu, R.A.M., Liu, Y.Y., 2016. Annual South American forest loss estimates based on passive microwave remote sensing (1990–2010). *Biogeosciences* 13, 609–624. doi:10.5194/bg-13-609-2016
128. Walsh, K., White, C.J., McInnes, K., Holmes, J., Schuster, S., Richter, H., Evans, J.P., Di Luca, A., Warren, R.A., 2016. Natural hazards in Australia: storms, wind and hail. *Climatic Change*. doi:10.1007/s10584-016-1737-7
129. Wang, B., Liu, D.L., Macadam, I., Alexander, L.V., Abramowitz, G., Yu, Q., 2016. Multi-model ensemble projections of future extreme temperature change using a statistical downscaling method in south eastern Australia. *Climatic Change* 138, 85–98. doi:10.1007/s10584-016-1726-x
130. Whitley, R., Beringer, J., Hutley, L.B., Abramowitz, G., De Kauwe, M.G., Duursma, R., Evans, B., Haverd, V., Li, L., Ryu, Y., Smith, B., Wang, Y.-P., Williams, M., Yu, Q., 2016. A model inter-comparison study to examine limiting factors in modelling Australian tropical savannas. *Biogeosciences* 13, 3245–3265. doi:10.5194/bg-13-3245-2016
131. Wilson, K.-J., Turney, C.S.M., Fogwill, C.J., Blair, E., 2016. The impact of the giant iceberg B09B on population size and breeding success of Adélie penguins in Commonwealth Bay, Antarctica. *Antarctic Science* 28, 187–193. doi:10.1017/S0954102015000644
132. Winter, K., Woodward, J., Dunning, S.A., Turney, C.S.M., Fogwill, C.J., Hein, A.S., Gollidge, N.R., Bingham, R.G., Marrero, S.M., Sugden, D.E., Ross, N., 2016. Assessing the continuity of the blue ice climate record at Patriot Hills, Horseshoe Valley, West Antarctica: GPR assessment of Patriot Hills BIA. *Geophysical Research Letters* 43, 2019–2026. doi:10.1002/2015GL066476
133. Wong, P.P.-Y., Lai, P.-C., Low, C.-T., Chen, S., Hart, M., 2016. The impact of

environmental and human factors on urban heat and microclimate variability. *Building and Environment* 95, 199–208.

doi:10.1016/j.buildenv.2015.09.024

134. Wood, J.R., Wilmshurst, J.M., Turney, C.S.M., Fogwill, C.J., 2016. Palaeoecological signatures of vegetation change induced by herbivory regime shifts on subantarctic Enderby Island. *Quaternary Science Reviews* 134, 51–58. doi:10.1016/j.quascirev.2015.12.018

135. Yang, Y., Liu, D.L., Anwar, M.R., O'Leary, G., Macadam, I., Yang, Y., 2016. Water use efficiency and crop water balance of rainfed wheat in a semi-arid environment: sensitivity of future changes to projected climate changes and soil type. *Theoretical and Applied Climatology* 123, 565–579. doi:10.1007/s00704-015-1376-3

136. Yit Sen Bull, C., van Seville, E., 2016. Sources, fate, and pathways of Leeuwin Current water in the Indian Ocean and Great Australian Bight: A Lagrangian study in an eddy-resolving ocean model: TRACKING SOURCES OF THE LEEUWIN CURRENT. *Journal of Geophysical Research: Oceans* 121, 1626–1639. doi:10.1002/2015JC011486

137. Ypma, S.L., van Seville, E., Kiss, A.E., Spence, P., 2016a. The separation of the East Australian Current: A Lagrangian approach to potential vorticity and upstream control: EAST AUSTRALIAN CURRENT SEPARATION. *Journal of Geophysical Research: Oceans* 121, 758–774. doi:10.1002/2015JC011133

138. Ypma, S.L., van Seville, E., Kiss, A.E., Spence, P., 2016b. The separation of the East Australian Current: A Lagrangian approach to potential vorticity and upstream control. *Journal of Geophysical Research: Oceans* 121, 758–774. doi:10.1002/2015JC011133

139. Yu, J., Menviel, L., Jin, Z.D., Thornalley, D.J.R., Barker, S., Marino, G., Rohling, E.J., Cai, Y., Zhang, F., Wang, X., Dai, Y., Chen, P., Broecker, W.S., 2016. Sequestration of carbon in the deep Atlantic during the last glaciation. *Nature Geoscience* 9, 319–324. doi:10.1038/ngeo2657

140. Yue, R.P.H., Lee, H.F., Hart, M.A., 2016. The human dimension of visibility degradation in a compact city. *Natural Hazards* 82, 1683–1702. doi:10.1007/s11069-016-2263-7

141. Yue, R.P.H., Lee, H.F., Hart, M.A., 2016. Perceptions of visibility degradation in Hong Kong. *Journal of Environmental Planning and Management* 1–19. doi:10.1080/09640568.2016.1197826

142. Zafar, M.U., Ahmed, M., Rao, M.P., Buckley, B.M., Khan, N., Wahab, M., Palmer, J., 2016. Karakorum temperature out of phase with hemispheric trends for the past five centuries. *Climate Dynamics* 46, 1943–1952. doi:10.1007/s00382-015-2685-z

143. Zhang, Y., Peña-Arancibia, J.L., McVicar, T.R., Chiew, F.H.S., Vaze, J., Liu, C., Lu, X., Zheng, H., Wang, Y., Liu, Y.Y., Miralles, D.G., Pan, M., 2016. Multi-decadal trends in global terrestrial evapotranspiration and its components. *Scientific Reports* 6, 19124. doi:10.1038/srep19124

144. Zheng, X., Kao, S., Chen, Z., Menviel, L., Chen, H., Du, Y., Wan, S., Yan, H., Liu, Z., Zheng, L., Wang, S., Li, D., Zhang, X., 2016. Deepwater circulation variation in the South China Sea since the Last Glacial Maximum: South China Sea Deep Current. *Geophysical Research Letters* 43, 8590–8599. doi:10.1002/2016GL070342

2016 Active Research Projects

Investigator Abramowitz,Gab
Grant
Scheme EIF Subcontract
Grant title Development of research infrastructure to support the protocol for the analysis of land surface models (pals) online web application
Duration 2012 - 2016
Awarded
Budget 285,000

Investigator Alexander,Lisa
Grant Discovery Project
Scheme
Grant title Has rainfall become more variable or extreme?
Duration 2016 - 2018
Awarded
Budget 339,000

Investigator Donat,Markus
Grant
Scheme ARC Discovery Early Career Researcher Award (DECRA)
Grant title How far in advance can we predict extreme temperature and rainfall events?
Duration 2015 - 2017
Awarded
Budget 367,536

Investigator England,Matt
Grant
Scheme ARC Discovery Early Career Researcher Award (DECRA) Shared Grant
Grant title Understanding the termination of el niño-southern oscillation events - phd student Eteban Abellan
Duration 2015 - 2016
Awarded
Budget 41,583

Investigator England,Matt
Grant
Scheme Australian Laureate Fellowship
Grant title Future risks associated with ocean surface warming: impacts on climate, rainfall, carbon, and circulation
Duration 2011 - 2016

**Awarded
Budget** 1,250,252

Investigator England,Matt
Grant Scheme Postdoctoral research associate 1 - Agus Santosa - future risks associated with ocean surface warming: impacts on climate, rainfall, carbon, and circulation
Grant title 2011 - 2016
Duration 400,910
Awarded Budget 652,960

Investigator England,Matt
Grant Scheme Postdoctoral research associate 2 - Andrea Taschetto - future risks associated with ocean surface warming: impacts on climate, rainfall, carbon, and circulation
Grant title 2011 - 2016
Duration 400,910
Awarded Budget 106,676

Investigator England,Matt
Grant Scheme Postgraduate researcher (1) - David Hutchinson - future risks associated with ocean surface warming: impacts on climate, rainfall, carbon, and circulation
Grant title 2011 - 2016
Duration 106,676
Awarded Budget 400,910

Investigator England,Matt
Grant Scheme Postgraduate researcher (2) - Nicola Maher - future risks associated with ocean surface warming: impacts on climate, rainfall, carbon, and circulation
Grant title 2012 - 2016
Duration 106,676
Awarded Budget 400,910

Investigator England,Matt
Grant Scheme Salary support - future risk associated with ocean surface warming: impacts on climate, rainfall, carbon and circulation
Grant title 2011 - 2016
Duration 652,960
Awarded Budget 33,000

Investigator	England,Matt
Grant	Dept. Of Environment - National Environmental Science Programme (NESP) Shared
Scheme	Grant
Grant title	Project 2.2 enhancing australia's capacity to manage climate variability and climate extremes in a changing climate
Duration	2016 - 2019
Awarded	
Budget	217,500

Investigator	England,Matt
Grant	
Scheme	Discovery Project
Grant title	Remote forcing of pacific ocean variability and impacts on global climate
Duration	2015 - 2017
Awarded	
Budget	621,400

Investigator	England,Matt
Grant	
Scheme	Postgraduate Studentship
Grant title	Global atmospheric and oceanic influences on changes in southern hemisphere extratropical climate - scholarship for Ariaan Purich
Duration	2014 - 2017
Awarded	
Budget	33,000

Investigator	Evans,Jason
Grant	
Scheme	Contract Research
Grant title	Better data-driven decision making under future climate uncertainty
Duration	2016 - 2017
Awarded	
Budget	59,600

Investigator	Evans,Jason
Grant	
Scheme	Narclim (nsw and act regional climate model).
Grant title	2011 - 2016
Duration	683,027
Awarded	150,000
Budget	

Investigator	Evans,Jason
Grant Scheme	Dept. Of Environment - National Environmental Science Programme (NESP) Shared Grant
Grant title	Project 2.6 regional climate projections science, information and services
Duration	2016 - 2019
Awarded Budget	108,750

Investigator	Evans,Jason
Grant Scheme	Project 2.8 extreme weather projections
Grant title	2016 - 2019
Duration	108,750
Awarded Budget	67,369

Investigator	Evans,Jason
Grant Scheme	Future Fellowship
Grant title	How will climate change affect sub-daily precipitation?
Duration	2012 - 2016
Awarded Budget	67,369

Investigator	Evans,Jason
Grant Scheme	Salary support: how will climate change affect sub-daily precipitation?
Grant title	2012 - 2016
Duration	514,528
Awarded Budget	348,749

Investigator	Evans,Jason
Grant Scheme	State Government Contract
Grant title	Feasibility of running 150 year regional climate simulations
Duration	2016 - 2017
Awarded Budget	130,000

Investigator	Green,Donna
--------------	-------------

Grant Scheme Project Grant
Grant title Health impacts of climate change on indigenous australians: identifying climate thresholds to enable the development of informed adaptation strategies
Duration 2011 - 2016
Awarded Budget 348,749

Investigator Hart,Melissa
Grant Scheme Environmental Research Program
Grant title Forecasting air pollution impacts from hazard reduction burns
Duration 2015 - 2018
Awarded Budget 149,900

Investigator Hart,Melissa
Grant Scheme State Government Contract
Grant title Forecasting air pollution impacts from hazard reduction burns
Duration 2015 - 2018
Awarded Budget 30,000

Investigator Kirkpatrick,Sarah
Grant Scheme ARC Discovery Early Career Researcher Award (DECRA)
Grant title A comprehensive understanding of Australian heat waves: past, present and future
Duration 2014 - 2016
Awarded Budget 394,299

Investigator Liu,Yi
Grant Scheme ARC Discovery Early Career Researcher Award (DECRA)
Grant title Characterising changes in Australia's vegetation for biomass monitoring, carbon accounting and fire hazard mapping
Duration 2014 - 2016
Awarded Budget 385,279

Investigator Menviel,Laurie



Grant Scheme ARC Discovery Early Career Researcher Award (DECRA)
Grant title What is the impact of abrupt climate change on the global carbon cycle?
Duration 2015 - 2018
Awarded Budget 369,536

Investigator Pitman,Andy
Grant Scheme Engagement And Impact Technical Working Group
Grant title Contract no. 15/16-137 - participation of the appointee as a member of the engagement and impact technical working group
Duration 2016 - 2017
Awarded Budget 4,792

Investigator Pitman,Andy
Grant Scheme State Government Contract
Grant title Medium term seasonal-weather and climate forecasts
Duration 2016 - 2017
Awarded Budget 150,000

Investigator Santoso,Agus
Grant Scheme Commonwealth Government Contract
Grant title Tropical variability in a warming world 2013
Duration 2013 - 2017
Awarded Budget 190,909

Investigator Santoso, Agus
Grant Scheme Tropical variability in a warming world 2015
Grant title 2015 - 2017
Duration 150,000
Awarded Budget 190,909

Investigator Sen Gupta,Alex
Grant Scheme ARC Linkage Project Industry Partner Contribution

Grant title Understanding the effect of small-scale ocean process on tuna populations - a new tool to forecast tuna distributions for use in fisheries management
Duration 2015 - 2018
Awarded Budget 60,000

Investigator Sen Gupta,Alex
Grant Scheme Flagship Postgraduate Scholarship
Grant title Mesoscale and regional ocean dynamics and prediction - scholarship for yue li
Duration 2014 - 2016
Awarded Budget 17,874

Investigator Sen Gupta,Alex
Grant Scheme Linkage Project
Grant title Understanding the effect of small-scale ocean process on tuna populations - a new tool to forecast tuna distributions for use in fisheries management
Duration 2015 - 2018
Awarded Budget 160,518

Investigator Sherwood,Steve
Grant Scheme Australian Laureate Fellowship
Grant title ALF salary support - revisiting the physics of clouds
Duration 2015 - 2020
Awarded Budget 752,770

Investigator Sherwood,Steve
Grant Scheme Australian Laureate Fellowship
Grant title PDRA 1 - revisiting the physics of clouds - Abhnil Prasad
Duration 2015 - 2020
Awarded Budget 462,190

Investigator Sherwood,Steve
Grant Scheme Australian Laureate Fellowship
Grant title PDRA 2 - revisiting the physics of clouds - Damianos Mantsis

Duration 2015 - 2020
Awarded Budget 462,190

Investigator Sherwood,Steve
Grant Scheme Australian Laureate Fellowship
Grant title PGR 1 - revisiting the physics of clouds - Jiawei Bao
Duration 2015 - 2020
Awarded Budget 101,624

Investigator Sherwood,Steve
Grant Scheme Australian Laureate Fellowship
Grant title PGR 2 - revisiting the physics of clouds - TBC
Duration 2015 - 2020
Awarded Budget 101,624

Investigator Sherwood,Steve
Grant Scheme Australian Laureate Fellowship
Grant title Revisiting the physics of clouds
Duration 2015 - 2020
Awarded Budget 884,883

Investigator Sherwood,Steve
Grant Scheme Dept. Of Environment - National Environmental Science Programme (NESP) Shared Grant
Grant title Earth systems and climate change hub
Duration 2015 - 2021
Awarded Budget 10,000

Investigator Sherwood,Steve
Grant Scheme Discovery Project
Grant title Testing a new explanation of cloud feedback on global climate
Duration 2014 - 2017
Awarded Budget 360,000

Investigator	Spence,Paul
Grant Scheme	ARC Discovery Early Career Researcher Award (DECRA)
Grant title	Dynamics, variability and change in southern ocean abyssal flows.
Duration	2015 - 2018
Awarded Budget	357,024

Investigator	Pitman, Andy. Sherwood, Steve. Alexander, Lisa. England, Matt
Grant Scheme	ARC Centres of Excellence
Grant title	ARC Centre of Excellence for Climate System Science
Duration	2011 - 2018
Awarded Budget	21,400,000



Appendix C – 2016 Centre Personnel

Professors

Prof Matthew England (ARC Laureate Fellow, CCRC Deputy Director)

Prof Andy Pitman (ARCCSS Director)

Prof Steven Sherwood (ARC Laureate Fellow, CCRC Director)

Prof Chris Turney (ARC Laureate Fellow)

Faculty

Dr Gab Abramowitz

A/Prof Lisa Alexander

A/Prof Jason Evans (ARC Future Fellow)

A/Prof Donna Green

Dr Melissa Hart (ARCCSS Graduate Director)

Dr Angela Maharaj

Dr Ben McNeil

A/Prof Katrin Meissner (ARC Future Fellow)

Dr Alex Sen Gupta

Post-Doctoral Research Fellows, Research Associates and Research Assistants (including ARCCSS funded positions)

Dr Joe Andersen

Dr Daniel Argueso

Dr Margot Bador

Dr Julien Boucharel

Dr Claire Carouge

Dr Mark Decker

Dr Alejandro Di Luca

Dr Giovanni Di Virgilio

Dr Vishal Dixit

Dr Markus Donat

Dr Chris Fogwill

Dr Leela Frankcombe

Dr David Fuchs

Dr Olivier Geoffroy

Dr Nicholas Hannah

Dr Daniel Hernandez-Deckers

Dr Nicolas Herold

Dr Ryan Holmes

Dr Jules Kajtar

Dr Yi Liu

Dr Shaoxiu Ma

Dr Damianos Mantis

Dr Laurie Menviel

Dr Roman Olson

Dr Jonathan Palmer

Dr Sarah Perkins-Kirkpatrick

Dr Steven Phipps

Dr Abhnil Prasad

Dr Agus Santoso

Dr Joe Scutt Phillips

Dr Paul Spence

Dr Andrea Taschetto

Dr Zoe Thomas

Dr Stephanie Waterman

Dr Anna Ukkola

Dr Yue Zheng

Professional Staff (including ARCCSS funded positions)

Vilia Co

Stephen Gray

Swa Rath

Brohwen Smith

Alvin Stone

Higher Degree Research Students (and their primary supervisor)

Esteban Abellan Villardon (McGregor)

Kaitlin Alexander (Meissner)

Oliver Angelil (Perkins-Kirkpatrick)

Witold Bagniewski (Meissner)

Jiawei Bao (Sherwood)

Alice Barthel (Waterman)

Chris Bull (Van Seville)
Arden Burrell (Evans)
Cameron Cairns (Sherwood)
Wasin Chaivarnant (Evans)
Xi Chen (Liu)
Hamish Clarke (Pitman)
Maxime Colin (Sherwood)
Steeffan Contractor (Alexander)
Nathan Cooper (Green)
Annika Dean (Green)
Earl Duran (England)
Shaun Filer (Green)
Peter Gibson (Perkins)
James Goldie (Alexander)
Mia Gross (Alexander)
Ned Haughton (Abramowitz)
Nadja Herger (Abramowitz)
Sanaa Hobeichi (Abramowitz)

Chiara Holgate (Liu)
Willem Huiskamp (Turney)
Carlo Jamandre (Hart)
Yue Li (Sen Gupta)
Yiling Liu (Donat)
Mat Lipson (Hart)
Tamas Loughran (Perkins-Kirkpatrick)
Nicola Maher (England)
Helen Millman (Fogwill)
Nidhi Nishant (Sherwood)
Marissa Parry (Green)
Valeria Prando (Spence)
Acacia Pepler (Alexander)
Sarah Perry (McGregor)
Ariaan Purich (England)
Shirley Qin (Sen Gupta)
Jessica Roe (Turney)
Rosalie Schultz (Green)
David Webb (England)

Adjuncts, Visiting Fellows and Visiting Researchers

Dr Marc Dorgeville
Prof Alan Dupont
Prof Michael Goldstein
Prof Hoshin Gupta
Prof Babette Hoogakker
Dr Nicolas Jourdain
Dr Joseph Kidston
Dr Ian Macadam
Dr Shayne McGregor

Dr Michael Molitor
Dr Ruby Leung
Prof Paul O'Gorman
Prof Stefan Rahmstor
Dr Vincent Rossif
Dr Oleg Saenko
Prof Roger Smith
Dr Milton Speer
Dr Caroline Ummenhofer

Affiliated UNSW Staff

Prof Mike Archer
A/Prof Jeremy Bailey
A/Prof Gary Froyland

A/Prof Mark Holzer
Dr Fiona Johnson
Prof Jane McAdam

Visiting Students and Research Interns

Paul Hartlip
Igor Kroener
Niamh Kyriacou
William Li
Alex Maldonado
Sridhar Mantripragada
Ditiro Benson Moalafhi
Joel Pippard

Ines Richter
Tomas Steele
Hu Hsin Su
Michael Su
Kathryn Turner
Campbell Young

Appendix D – 2015 Media & Publicity

NAME	MEDIA TYPE	MEDIA OUTLET	ARTICLE PROGRAM NAME
Abellan, E.	Newspaper	The Sydney Morning Herald	Summer heat builds across southern Australia as big El Nino starts to break down
Alexander, L.	Online	SciDev.Net	Australia cuts funding on key research agency
Alexander, L.	Radio	Radio Ecoschock	94 different stations
Alexander, L.	TV	ABC	Catalyst
Alexander, L.	Radio	Radio Ecoschock	Radio Ecoschock
Donat, M.	Online	Science Codex	How 2 degrees may turn into 4.
Donat, M.	Online	Phys.org	How 2 degrees rise means even higher temperatures where we live.
Donat, M.	Online	Chennai online	How to degree target to tame global warming can't be met
Donat, M.	Online	Zee News	'Paris climate pact not enough to tame global warming'.
Donat, M.	Newspaper	The Financial Times	Climate change: 2° target to tame global warming can't be met; here is why
Donat, M.	Online	IndyBay	Regional impact of global 2 degrees C actually means far higher temperatures
Donat, M.	Online	National Daily Press	Does the world really warm to an average of 2 degrees C
Donat, M.	Radio	ABC Radio	The World Today
Donat, M.	Radio	Radio Ecoschock	
Donat, M.	Magazine	Cosmos Magazine	Global warming will dump rain in dry areas - but not in a helpful way
Donat, M.	Online	Christian Daily	Climate change news: Rates of global rainfall are increasing
Donat, M.	Newspaper	Summit County Voice	Global warming could boost rainfall in world's deserts
Donat, M.	Online	Huffington Post	Global warming will drive extreme rain and flooding, study finds
England, M.	Radio	NSW Country Hour	Country Hour NSW
England, M.	Film/Documentary	Update Productions	Future of Oceans
England, M.	Online	Eureka Street	My climate change denial is worse than Malcolm Roberts'
England, M.	Online	DeSmog Blog	Australia's climate denialist senator Malcom Roberts fails high school science in maiden speech
England, M.	Magazine	The Good Weekend	John Church and the rising ocean
England, M.	Online	DeSmog Blog	Australia's new climate science denilaist senator, Malcolm Roberts, has a history of harassing academics
England, M.	Online	The Conversation	Government offers hope by telling CSIRO to reinvest in climate research
England, M.	Radio	The Wire 2SER-FM	Climate change and CSIRO job cuts
England, M.	Newspaper	Sydney Morning Herald	Burning fossil fuels would 'cook' Earth, raise temperatures 8 degrees: study
England, M.	TV	BBC	Sea-level rise factors unravelled
Evans, J.	Radio	ABC Newcastle 1233	Drive with Jason Evans
Goldie, J.	Online	ABC News	Apps that help you get to know the world around you
Meissner, K.	Online	The Conversation	Mass extinctions and climate change: Why the speed of rising greenhouses gases matters
Menviel, L.	Online	SBS	Ice age carbon hid deep in the Atlantic Ocean, new study reveals
Pepler, A.	Online	The Conversation	The role of climate change in eastern Australia's wild storms
Pepler, A.	Radio	2SER 107.3	Morning show w/ Sean Britten
Pepler, A.	Newspaper	Sydney Morning Herald	A couple of articles, inc "Sydney storms; lessons from a tempest"
Pepler, A.	TV	ABC	Catalyst
Pepler, A.	Radio	Beyond Zero Emissions	Climate change and east coast low-pressure systems
Pepler, A.	Online	Fairfax	East Coast Lows
Pepler, A.	Online	The Conversation	Nine years after the Pasha Buler storm we are finally getting a handle on east coast lows
Pepler, A.	Newspaper	Canberra Times	Eastern Australian flood events: a 'significant' rise in frequency, says study
Pepler, A.	Online	ABC Online	Wild weather: What caused the storms along Australia's east coast
Pepler, A.	Magazine	New Scientist	Australia hit by storms worsened by king tides and low pressure
Pepler, A.	Online	Australian Network News	Australia hit by storms worsened by king tides and low pressure
Pepler, A.	Newspaper	Canberra Times	Sydney wipeout: Residents evacuated, coastlines eroded as wild storms hit NSW (Video Explainer)
Perkins, S.	Radio	Radio Adelaide	2015 is number 5 on the heat parade
Perkins, S.	Newspaper	Newcastle Herald	Newcastle's hottest of three years
Perkins, S.	Radio	ABC Far North - Cairns	Breakfast with Kier Shorey
Perkins, S.	Radio	774 Melbourne ABC Radio	Mornings with Jon Faine

Perkins, S.	Online	The Conversation	We've learned a lot about heatwaves, but we're still just warming up
Perkins, S.	Online	ABC Online	Climate scientists feel the weight of the world on their shoulders
Perkins, S.	Newspaper	Sydney Morning Herald	Sydney set for a warm weekend before mercury soars to 33 on Monday
Perkins, S.	Newspaper	Sydney Morning Herald	Turning up the heat to push many Australian plants to the brink, study finds
Perkins, S.	Radio	Radio Adelaide ABC	The facts behind climate change.
Perkins, S.	Radio	The World Today - Radio National	Across the board climate records in 2015 no surprise: researcher
Perkins, S.	Newspaper	Sydney Morning Herald	Sydney weather: city could record hottest July day on Friday
Perkins, S.	Newspaper	Fairfax	Heatwaves explained
Perkins, S.	Online	news.com.au	Australia is not prepared for growing natural disasters, experts warn
Perkins, S.	Online	Inside Story	Underwater extremes
Perkins, S.	Online	The Conversation	New climate science centre doesn't make up for CSIRO cuts: experts
Perkins, S.	Newspaper	Herald Sun	Climate change: How Australia's capital cities will be hotter and drier by 2050
Perkins, S.	Online	Inside Story	A monster of a month
Perkins, S.	Newspaper	The Guardian	Global warming taking place at an 'alarming rate', UN climate body warns
Pitman, A.	Online	IET (EnviroTech)	A Time For Change How The Paris Agreement Could Shape The Future Of Our Climate
Pitman, A.	Online	SBS	Extreme weather set to continue in the new year.
Pitman, A.	Online	Science Daily	How a 2°C rise means even higher temperatures where we are living
Pitman, A.	Magazine	Health Medicine	How a 2°C rise means even higher temperatures where we live
Pitman, A.	Magazine	Climate Control News	Research warns of temperature extremes
Pitman, A.	Newspaper	Sydney Morning Herald	Paris climate limit will see some parts of the world warm by six degrees: Nature paper
Pitman, A.	Newspaper	Sydney Morning Herald	Super typhoons and a soaking for Australia: Weird weather explained
Pitman, A.	Interview	Newspaper	ARC funding: winners and losers in billion dollar science cash splash
Pitman, A.	Magazine	Good Weekend	John Church and the rising ocean
Pitman, A.	Newspaper	Sydney Morning Herald	'Calm waters' likely to elude embattled CSIRO chief, Larry Marshall
Pitman, A.	Online	DeSmog Blog	Australia's new climate science denilaist senator, Malcolm Roberts, has a history of harassing academics
Pitman, A.	Newspaper	Sydney Morning Herald	Labor slams the Turnbull government's 'flip-flopping' on CSIRO climate research
Pitman, A.	Newspaper	New York Times	In shift, Australia pledges more resources for climate research
Pitman, A.	TV	SBS	The crazy climate technofix
Pitman, A.	Radio	Background Briefing Radio National ABC	The inconvenient scientists
Pitman, A.	Newspaper	The Guardian	April breaks global temperature record, marking seven months of new highs
Pitman, A.	Newspaper	New Zealand Herald	2016 set to be the hottest after April smashes record
Pitman, A.	Newspaper	Huffington Post	Last month was the warmest April ever recorded, continuing 7-month hot streak
Pitman, A.	Other (Specify below in "Details")	Nature	Australia softens blow of climate change cuts
Pitman, A.	Newspaper	Sydney Morning Herald	Bureau of Meteorology plan to take over CSIRO climate research
Santoso, A.	Newspaper	Sydney Morning Herald	El Nino: The weather of 2015 captured in one image.
Santoso, A.	Other (Specify below in "Details")	Press Conference	N/A
Santoso, A.	Online	Wall Street Journal	El Niño May Be Weakening, but It Is Still Clobbering Crops
Santoso, A.	Online	Financial Times	El Niño: Feeling the heat
Santoso, A.	Online	CNN	El Niño is dead but La Niña is coming: Are we ready yet?
Santoso, A.	Online	CNN	Can La Nina save the world from record hot temperatures?
Santoso, A.	Online	Spatial Source	El Niño unveiled in incredibly detailed animation.
Santoso, A.	Newspaper	Wall Street Journal	Today's top supply chain and logistics news from WSJ
Santoso, A.	Online	The Daily Caller	Scientists are freaking out about February's record warmth - ignore the incredibly strong El Niño
Sen Gupta, A.	From MR	IFLS	Record breaking El Niño visualised in extraordinary detail.
Sen Gupta, A.	Online	Inertia	This extraordinary animation that explains El Niño took 30,000 hours to create
Sherwood, S.	Radio	Radio New Zealand	Nine to Noon
Sherwood, S.	Newspaper	Sydney Morning Herald	Temperature spike fuels climate change fears
Sherwood, S.	Online	ABC National news	CSIRO changes like putting bandaid over gaping wound, scientist says
Sherwood, S.	Radio	ABC radio national	
Sherwood, S.	Radio	ABC 720	Mornings with Wendy Harmer
Sherwood, S.	Radio	German National Public Radio	

Sherwood, S.	Newspaper	Sydney Morning Herald	Global warming tidings get an added boost after cloudy climate issue cleared up
Sherwood, S.	Radio	ABC	World Today
Sherwood, S.	Radio	2SER	The Daily
Sherwood, S.	Online	desmogblog	Graham Readfearn column
Sherwood, S.	Radio	SBS	News story
Sherwood, S.	Newspaper	Sydney Morning Herald	Everything you need to know about lightning
Sherwood, S.	Newspaper	Sydney Morning Herald	Stratosphere shrinks as record breaking temperatures continue because of climate change
Sherwood, S.	Newspaper	The Guardian	Why Malcolm Roberts's demand for 'empirical evidence' on climate change is misleading
Sherwood, S.	Radio	Hack Triple J ABC	How climate scientists respond to Malcolm Roberts
Sherwood, S.	Online	Climate Wire	CSIRO to create new climate research centre amidst cuts
Sherwood, S.	Newspaper	The Australian	CSIRO move 'not enough': staff
Sherwood, S.	Online	Climate Feedback	Analysis of Bjorn Lomborg's "An overheated climate alarm"
Sherwood, S.	Online	The Conversation	February's global temperature spike is a wake-up call.
Spence, P.	Newspaper	http://www.news-mail.com.au/	
Spence, P.	Film/Documentary	UNSW	Sustainable housing and climate change
Spence, P.	Newspaper	News Mail	Which Gladstone suburbs will be islands by 2100
Stone, A.	Online	ANI	How 2°C rise can up temperatures where we live.
Stone, A.	Online	Science Daily	Increasing costs of natural hazards as climate changes
Stone, A.	Online	Huffington Post	Australia is the centre of the universe... for sciences
Stone, A.	Online	Australian Academy of Science	Australian Research Council announces new Centres for Excellence
Stone, A.	Newspaper	Sydney Morning Herald	Australia's carbon budget to be exhausted in six years, Stockholm group says
Stone, A.	Press/Media Release	Multiple	How a 2°C rise means even higher temperatures where we live
Stone, A.	Press/Media Release	Multiple	Human caused global warming detected in 1930s
Stone, A.	Press/Media Release	Multiple	Global warming increases rain in world's driest areas
Stone, A.	Press/Media Release	Multiple	Early plant growth caused by global warming boosts extreme temperatures by 5°C
Stone, A.	Press/Media Release	Multiple	Extreme coral bleaching may be new normal by 2034
Stone, A.	Press/Media Release	Multiple	Record hot year may be the new normal by 2025
Stone, A.	Press/Media Release	Multiple	Enso animation
Taschetto, A.	Online	Grain Central	Are we heading for a La Niña Modoki?

