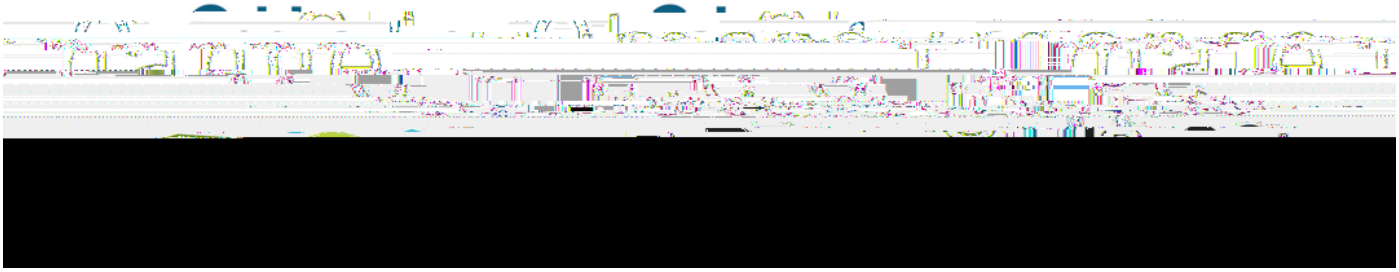

Annual Report 2013

!

!

!

"#$!%&'&( )!

!

!

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.!

!

! !

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

!

'

the editorial boards of international journals this year, and we continue to be strong contributors to influential media such as The Conversation.

Finally in 2013 the CCRC commenced its gradual move into School of Biological, Environmental and Earth Sciences (BEES). So far the disruption to daily life at the CCRC has been imperceptible except that we moved the schedule of our graduate student evaluations forward by two months to align them with the BEES examination timetable, forcing us to have a one-off slug of three exam rounds in a single calendar year (many thanks to our postgraduate coordinator Katrin Meissner for handling that!). Further

!
!

2013 Impact

One paper published in *Nature*. (Santoso et al). 12 papers published in *Nature* family journals. 13 papers in *Geophysical Research Letters.* 12 papers published in *Journal of Climate.*

Significant media coverage of Centre research accomplishments in 2013 including:

- 27 TV appearances/interviews
- 51 Radio appearances/interviews
- Over 100

!

,

!

!

Unusual El Ninos, like those that led to the extraordinary super El Nino years of 1982 and 1997, will occur twice as often under even modest global warming scenarios. That is the finding of *new collaborative research published in Nature* led by the authors from the Climate Change Research Centre and ARC Centre of Excellence for Climate System Science, which has for the first time revealed the cause of these events.

These unusual El Nino events differ from the more common kind in that sea surface temperatures start warming in the west of the Pacific Basin and spread eastwards. Under normal El Ninos, ocean surface temperatures first warm in the cold eastern Pacific and then expand west, in the direction of the Trade Winds and the ocean currents along the equator.!

!

!

The Climate Change Research Centre has a growing cohort of postgraduate research students. There were 29 individual students enrolled in the centre's PhD program and two honours students supervised in 2013.

The CCRC continued its robust annual progress review scheme, led by Post Graduate coordinator Katrin Meissner. 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.

Two PhD students and one master's student had their awards conferred in 2013.

Tristan Sasse. PhD thesis title:

!

by Steve Sherwood and Lisa Alexander

CCRC Director Professor Steve Sherwood was Lead Author, Chapter 7: Clouds and Aerosols, Working Group I Contribution to the IPCC Fifth Assessment Report Climate Change 2013: The Physical Science Basis.

Dr Lisa Alexander was Lead Author, Chapter 2: Observations: Atmosphere and Surface, Working Group I Contribution to the IPCC Fifth Assessment Report Climate Change 2013: The Physical Science Basis.

This story first appeared in *The Conversation*

Projected warming by 2100 is still about 3-5C above 2005, under the *high-emissions scenario*. AR5 takes a longer view than previous reports, noting that the most likely global warming by 2200 under this scenario is a shocking 9C above preindustrial. It also expands its consideration of the *palaeoclimate* record indicating that the last three decades were likely the warmest of the last 1400 years.
There has been a lot of fuss about the *slower warming* over the past 10-15 years, which AR5 acknowledges and attributes at least in part to natural variations within the climate system. AR5 also acknowledges that short term trends are a poor indicator of long term changes.

When combined with all other evidence this has a fairly small effect on the conclusions, reflected in a range of 1.5-4.5C per doubling of CO_2 for the so-called "equilibrium climate sensitivity". This is a return to the range in the first three assessment reports but broader than the 2.0-4.5C range assessed in 2007. The upper limit of the "transient climate response," a related measure, is also down by 0.5C.

New studies have shifted a few conclusions on the question of whether predicted changes can be detected in past observations. It is now clear that *both major ice sheets* and nearly all glaciers are melting. *High-rainfall events* (behind disasters such as recent Queensland floods) now seem to be heavier in many places.

But AR5 expresses less confidence that *tropical cyclones* are on the increase globally or that there are more *droughts globally*. This does not mean these things aren't happening but reflects a more nuanced understanding of how difficult it is to confirm them based on the imperfect information available.

Do we need another blockbuster IPCC report in 2019? Possibly not. As we authors can now attest from personal experience, these reports require a massive investment of time.

!

!   "(

!

Breuer, L., J. F. Exbrayat, I. Plesca, W. Buytaert, T. Ehmann, T. Peters, E. Timbe, K. Trachte, and D. Windhorst, 2013: Global Climate Change Impacts on Local Climate and Hydrology. *A Tropical Mountain Ecosystem of South Ecuador: Ecosystem Services, Biodiversity and Environmental* Springer, 265 - 274.

Rosenfield, D., R. Wood, L. J. Donner, and S. C.

Bishop, C. H. and G. Abramowitz, 2013 Climate model dependence and the replicate Earth paradigm *Climate Dynamics* **41** 885 - 900

Boex, J., C. J. Fogwill, N. F. Glasser, A. Hein, C. Schnabel, S. Xu, and S. Harrison, 2013: Rapid

nitrogen predictions. *Geoscientific Model Development*, **6,** 117 - 125.

Farrel, H., S. Brett, P. Ajani, and S. A. Murray, 2013: Distribution of the genus Alexandrium (Halim) and paralytic shellfish toxins along the coastline of New South Wales, Australia. *Marine Pollution Bulletin*, **72,** 133 -145.

Fernández-Donado, L., J. f. Gonzalez rouco, C. Raible, C. Ammann, D. Barriopedro, E. Garcia-Bustamante, J. H. Jungclaus, S. J. Lorenz, J.

Asymmetry in the response of Eastern Australia extreme rainfall to low-frequency Pacific variability. *Geophysical Research Letters*, **40,** 2271 - 227.

King, A. D., S. C. Lewis, S. Perkins, L. Alexander, M. G. Donat, D. J. Karoly, and M. T. Black, 2013: Limited Evidence of Anthropogenic Influence on the 2011-12 Extreme Rainfall over Southeast Australia. [in “Explaining Extreme Events of 2012 from a Climate Perspective”].

Westra, S., L. Alexander, and F. W. Zwiers, 2013: Global Increasing Trends in Annual Maximum Daily Precipitation. *Journal of Climate*, **26,** 3904-3918.

Westra, S., J. P. Evans, R. Mehrotra, and A. Sharma, 2013: A conditional disaggregation algorithm for generating fine time-scale rainfall data in a warmer climate. *Journal of Hydrology* **479,** 86 - 99.

Whan, K., L. Alexander, A. Imielska, S. McGree, D. Jones, E. Ene, S. Finaulahi, K. Inape, L. Jacklick, R. Kumar, V. Laurent, H. Malala, P. Malsale, R. Pulehetoa-Mitiepo, M. Ngemaes, A. Peltier, A.

Investigators	Pitman, A.
GrantScheme	

CCRC - Active Research Projects

Investigators	Evans, J.
GrantScheme	State Government Contract
GrantTitle	

CCRC - Active Research Projects

Investigators	Evans, J. Bormann, K.
GrantScheme	Contract Research
GrantTitle	CSIRO Marine and Atmospheric Research - contract research.
Duration	2012 -- 2013

!

!!

! !

!

4.#3&++#.+!

- ./0!123345 6!789:28;!<=>?3.2:@28!A2>.5235!B5::/ 6C!DDED!F5G>3H!F@.5I3/.J!
- ./0!=8;H!-@3K28!<=EDDLL!F@.5I3/.J!
- ./0!L35M58!L45.6//;!<DDED!F@.5I3/.J!
- ./0!D4.@?!N>.85H!<=ED!A2>.5235!B5::/ 6C!=;0>8I3J!

!

9/'-0(:!

F.!P2Q!=Q.2K/6@3R!!
F.!A@?2!=:5S28;5.!
=T-./0!U2?/8!7M28?!<=ED!B>3>.5!B5::/ 6J!
F.!F/882!P.558!
F.!15:@??2!V2.3!<=EDDLL!P.2;>235!;@.5I3/.J!

England, M.	Press/Media Release

!

Santoso, A.	Radio	2UE	Quotes for news	News
Santoso, A.	Online	Climate Spectator		

van Sebille, E.	Radio	Newcastle/Canberra	prerecorded interview	Dateline Pacific
van Sebille, E.	Film/Documentary	Radio New Zealand International	co-hosting episode	Tipping Points
van Sebille, E.	Online	International (The Weather Chanel, SBS Australia, VPRO, etc)	Opinion piece	Leave the ocean g