

The Victorian Climate Initiative: VicCI



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**Centre for Australian Weather and Climate Research
Bureau of Meteorology**



Australian Government
Bureau of Meteorology



The Centre for Australian Weather and Climate Research
A partnership between CSIRO and the Bureau of Meteorology

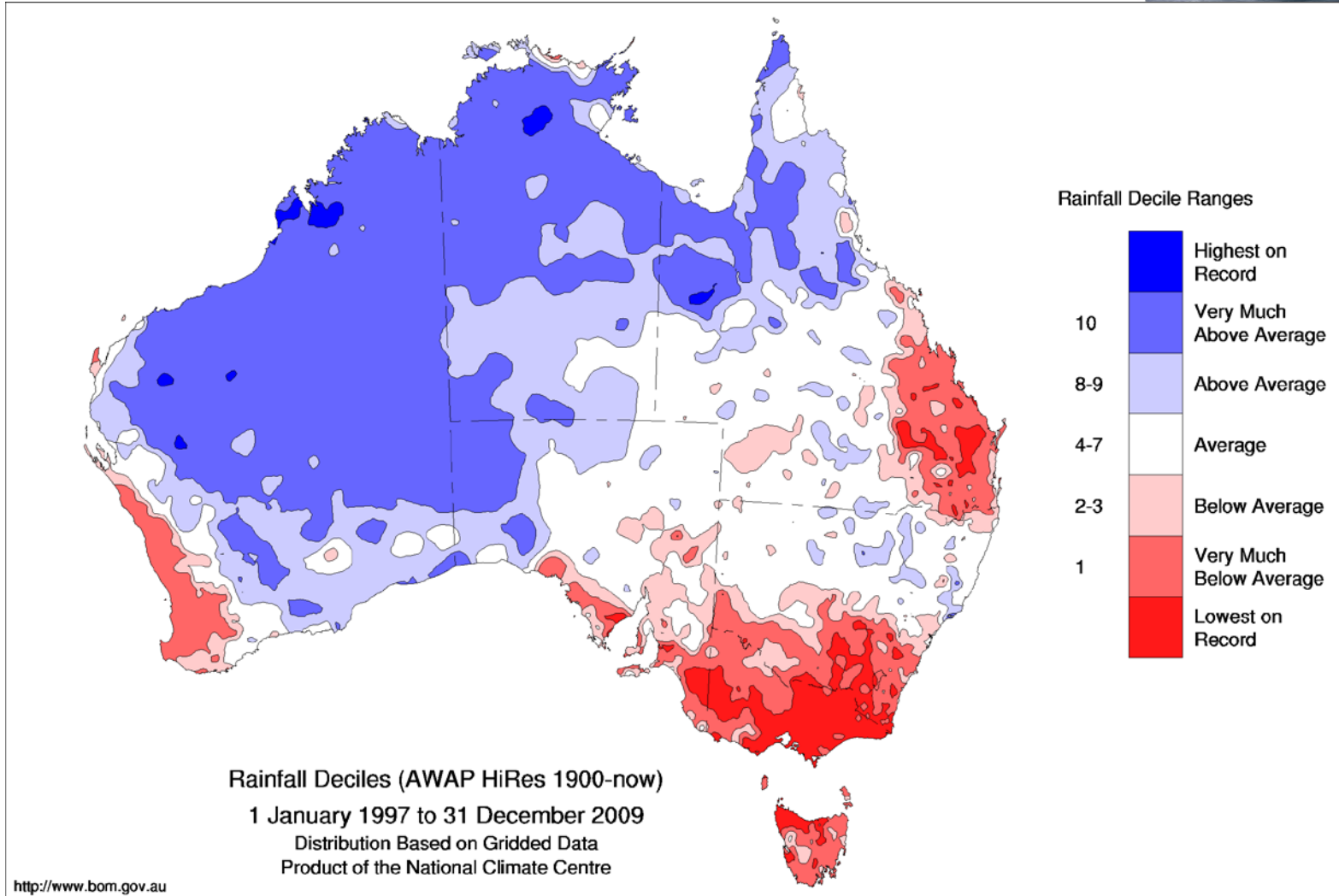


Overview of VicCI : rationale

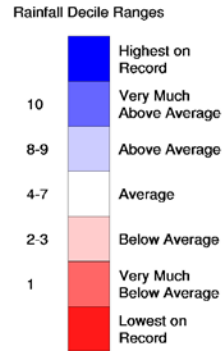
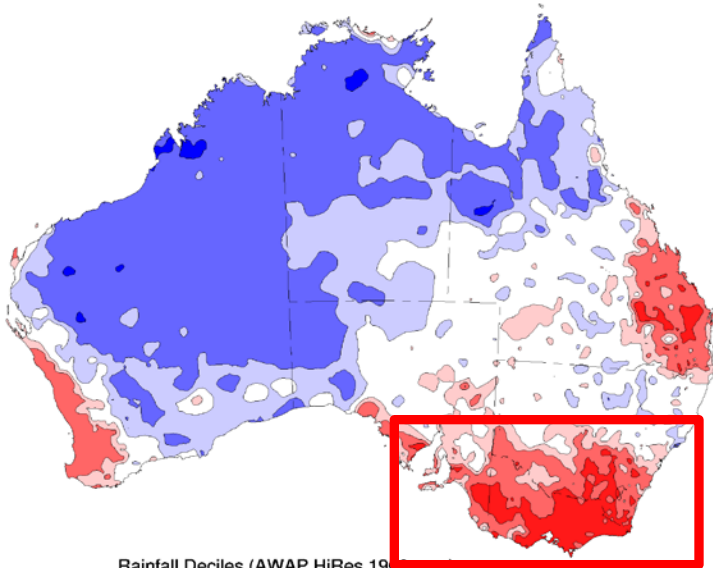


- Restart where SEACI ended: continuing a success story
- Smaller program: more targeted focus
- Interface of climate and hydrology
- Driven by user needs (water planning)
- Physical understanding, Predictability, Models assessment
- Prediction (year to multi-year), Projection (decadal to secular)
- Climate variability on multi-time scales

The Millennium Drought (1997-2009)



The Millennium Drought (1997-2009)



Rainfall Deciles (AWAP HiRes 1997-2009)

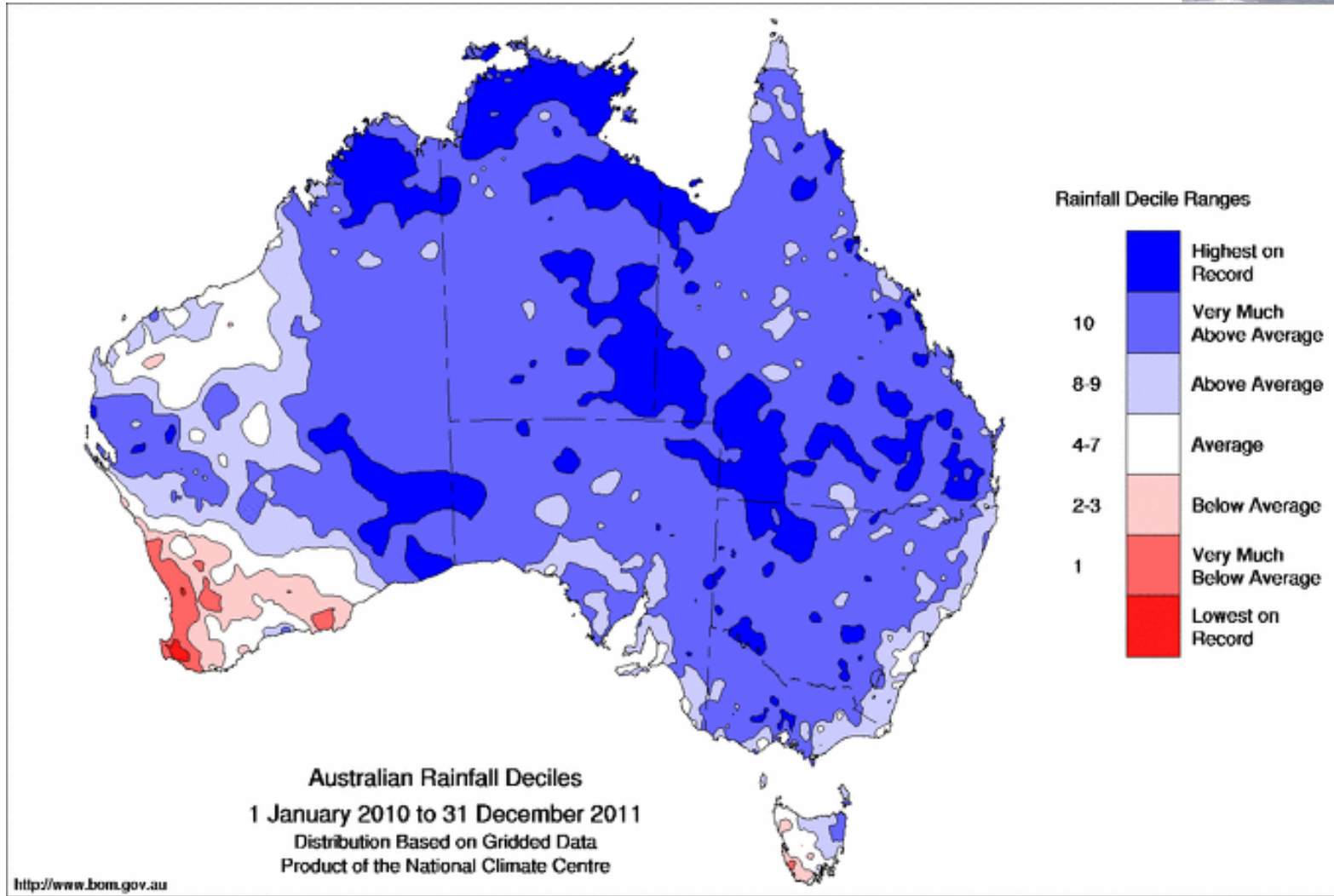
1 January 1997 to 31 December 2009

Distribution Based on Product of the Regions

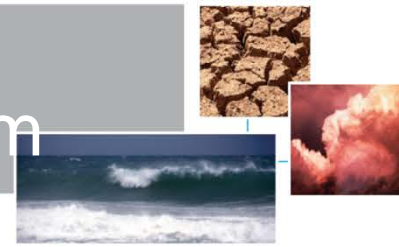
<http://www.bom.gov.au>

		MDR	Fildon	Yarra	Thomson	SEA
Previous 13 year dry (PD) period		1034 1046	1002 1014	1002 1014	1002 1014	1037 1040
Rainfall deficit	MD	-15 %	-18 %	-17 %	-15 %	-12%
	PD	13 %	8 %	4 %	5%	9%
Wettest year	MD	577	1090	1476	1420	611
	Rank	(15)	(62)	(61)	(49)	(44)
	Anomaly	23%	2%	2%	2%	5%
Summer anomaly	MD	543	1284	1735	1566	697
	Rank	(25)	(23)	(19)	(22)	(13)
	Anomaly	16%	15%	15%	13%	20%
Autumn anomaly	MD	-6%	-8%	-8%	-8%	-6%
	PD	11%	-10%	-8%	-9%	+8%
Winter anomaly	MD	-24%	-29%	-25%	-24%	-26%
	PD	-16%	-1%	+1%	-4%	-5%
Spring anomaly	MD	-4%	-16%	-13%	-12%	-9%
	PD	-7%	+1%	2%	+1%	-11%
Summer anomaly	MD	+3%	-12%	-14%	-13%	-6%
	PD	-26%	-5%	-5%	-3%	-13%

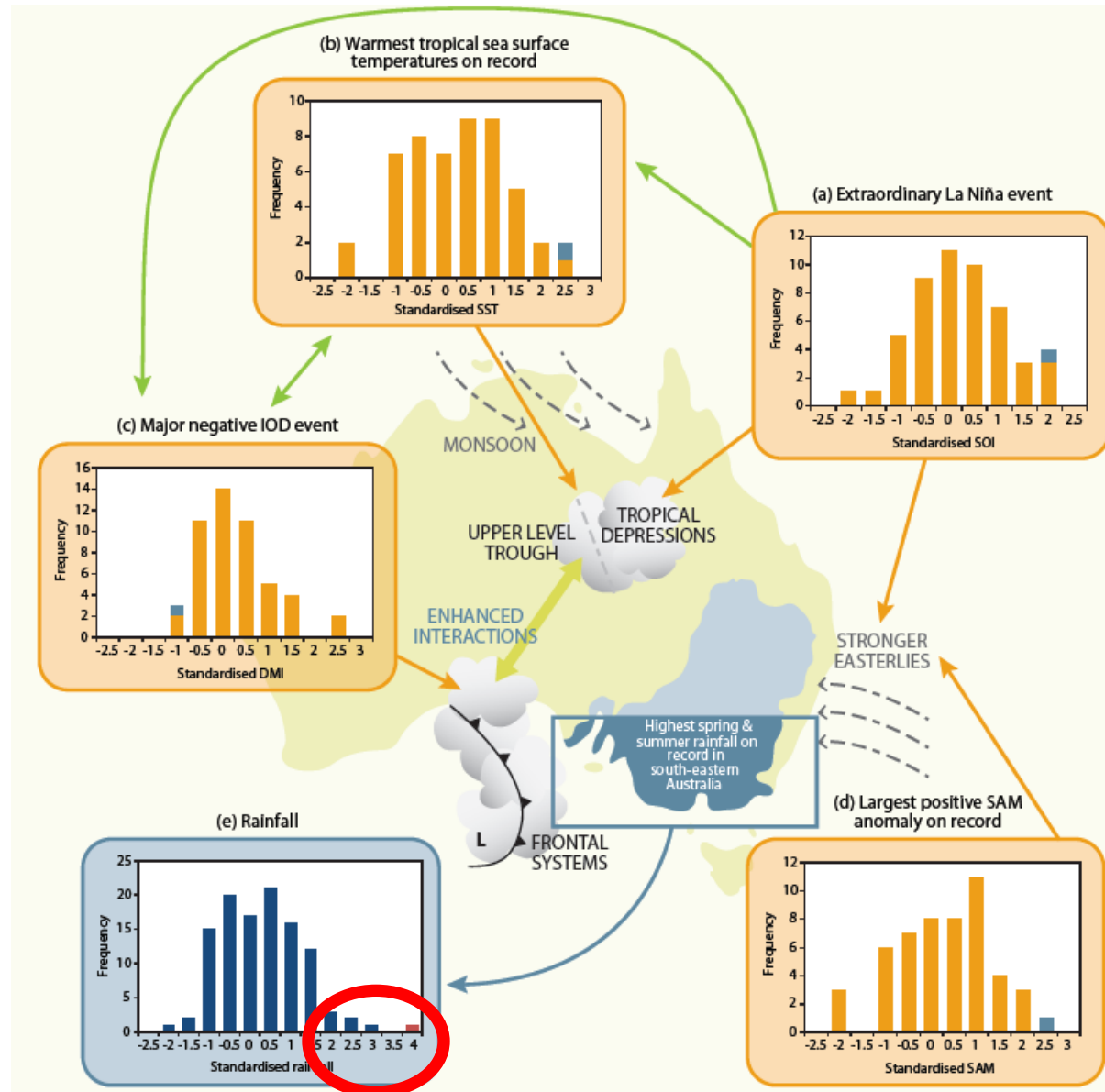
La Niñas of 2010-11 and 2011-12



La Niñas of 2010-11: perfect “climate” storm



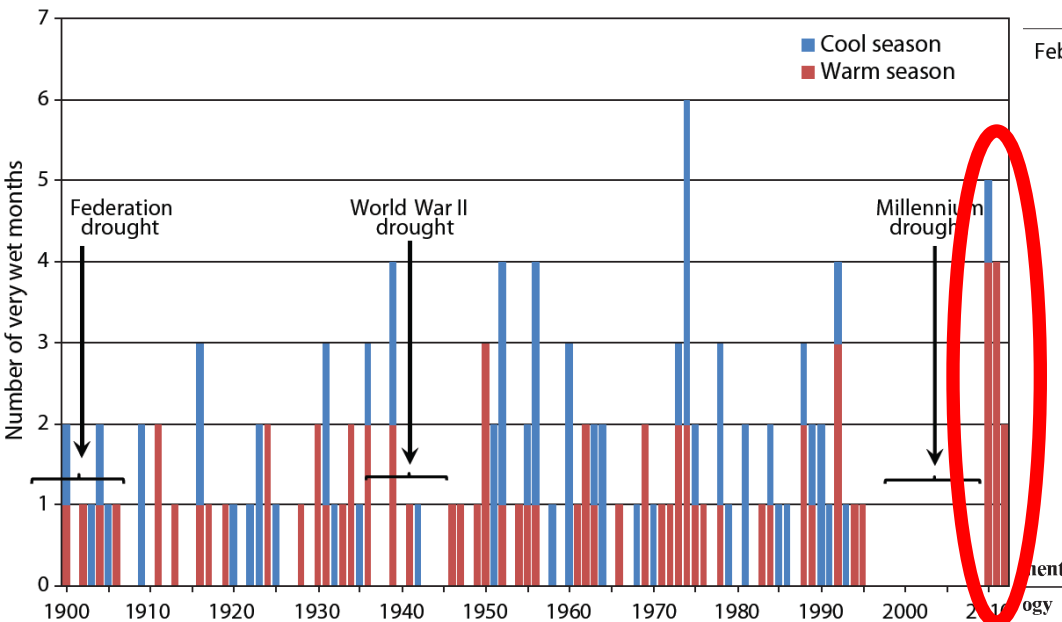
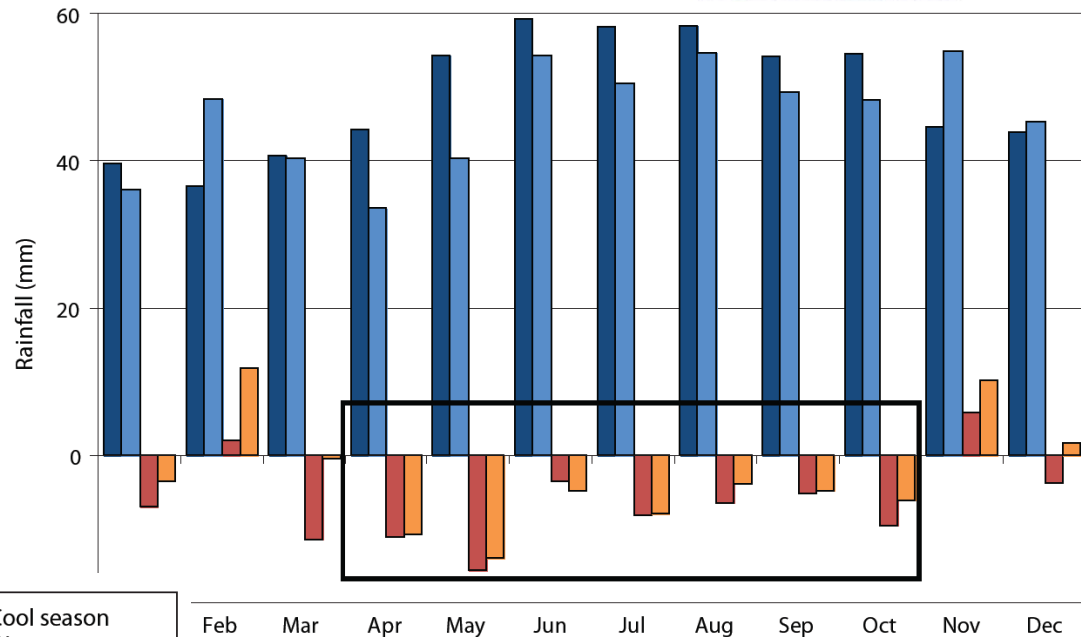
- Extraordinary large La Niña event
- All known climate drivers played a part
- The spring rainfall is very well accounted by these factors
- Debatable if on-going warming of SST played a role (summer rainfall)



La Niñas of 2010-11 and 2011-12

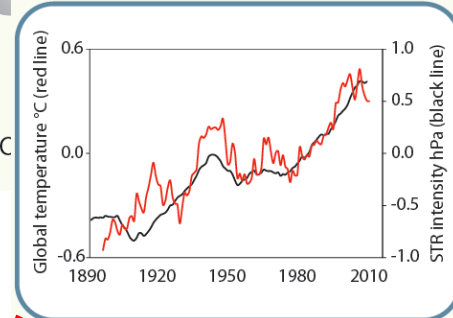
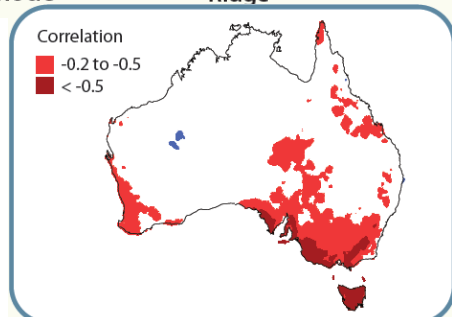
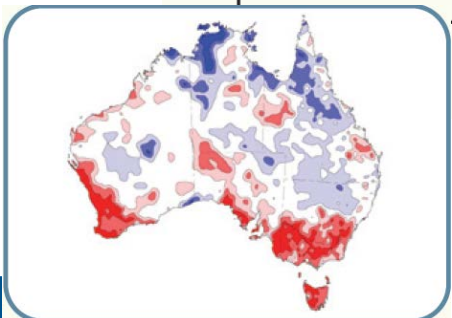
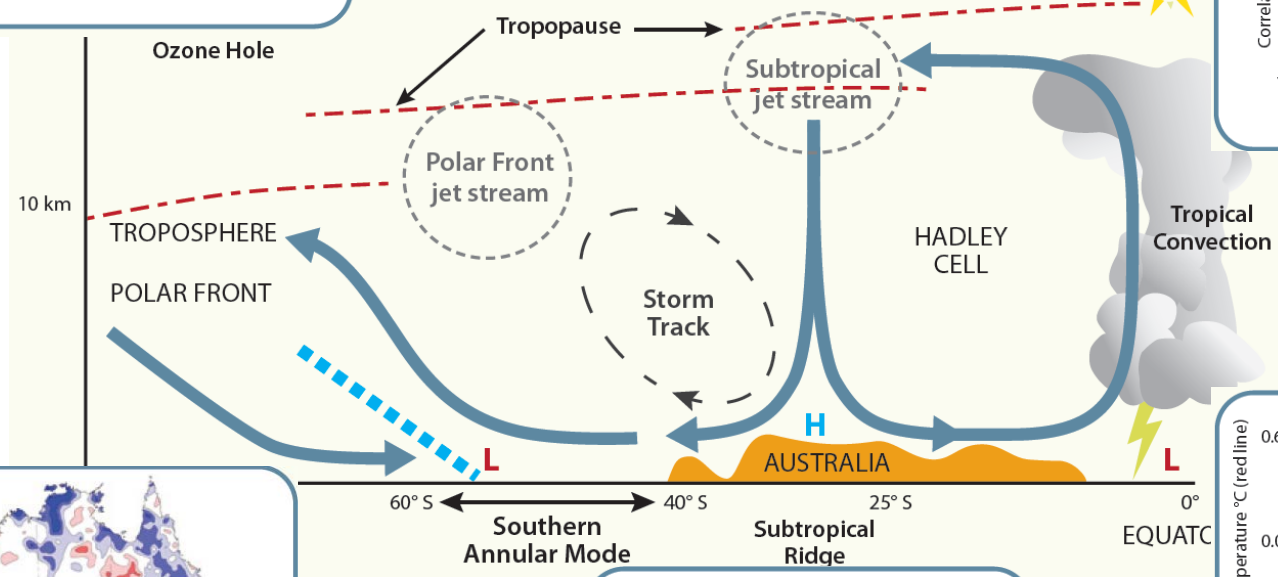
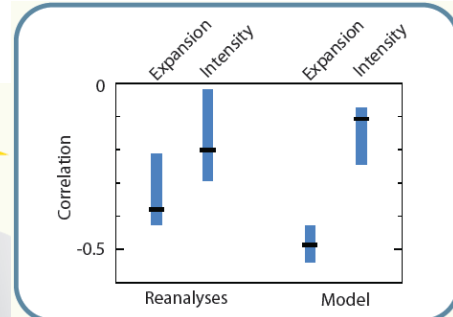
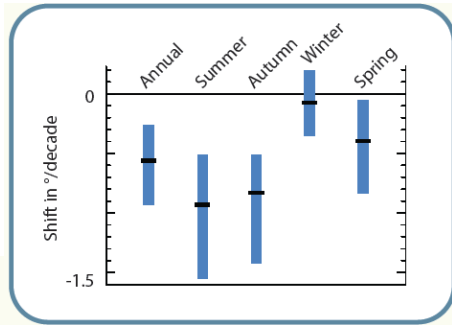
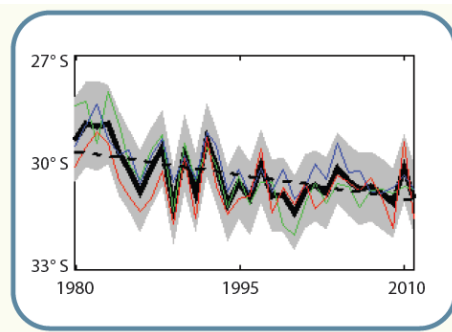


- One extreme to the other!
- Largest number of very wet months
- Warm half of the year
- 10 out of 12 possible months



- 2010-11 are the wettest 2 years on record across Australia
- “Only” 4th wettest in SEA
- Due to on-going cool season rainfall deficiency unchanged in 2010 and 2011

Mean Meridional Changes and their impacts

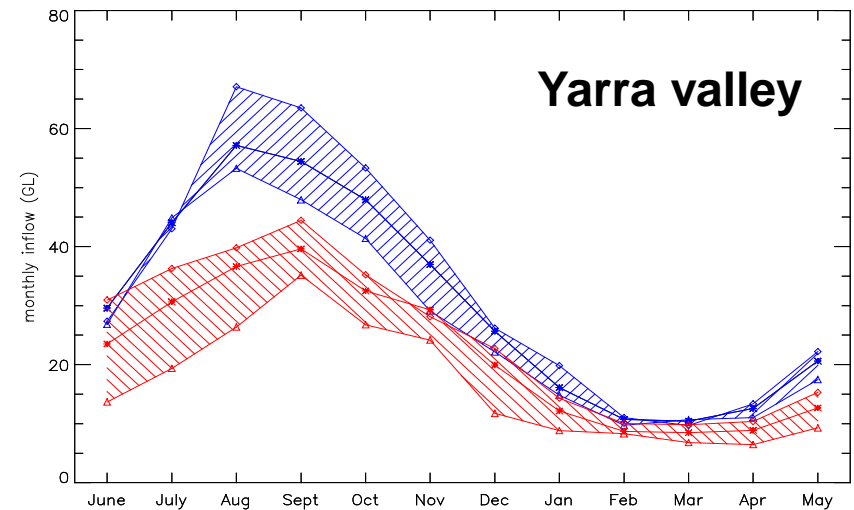
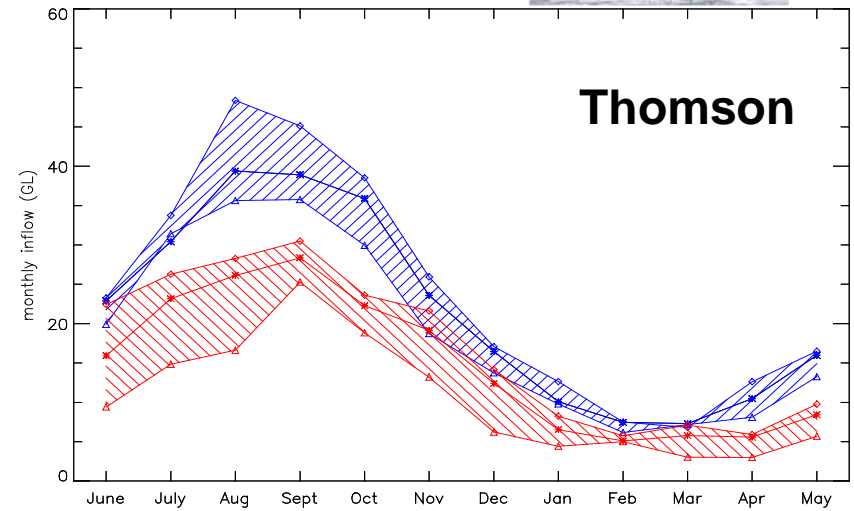
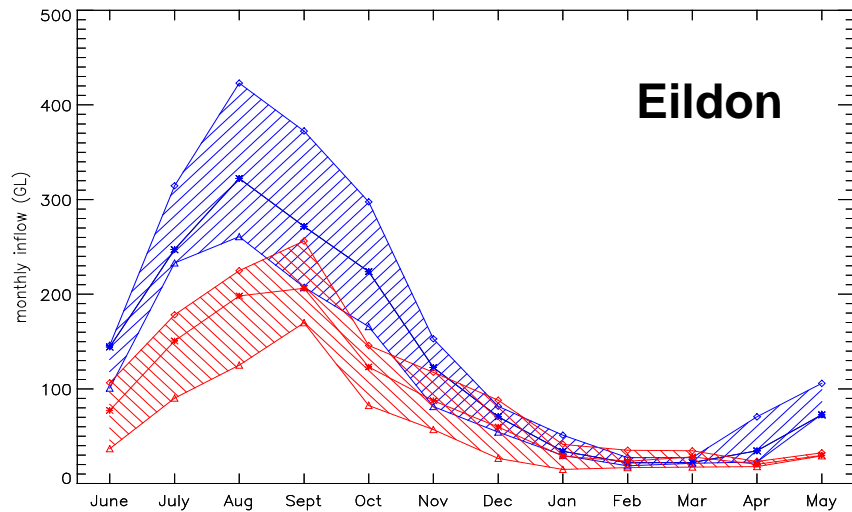


Has the influence changed in the last 20 years?

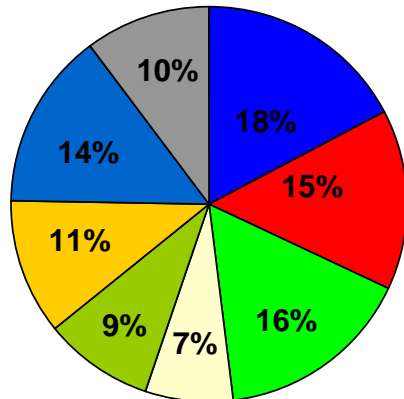
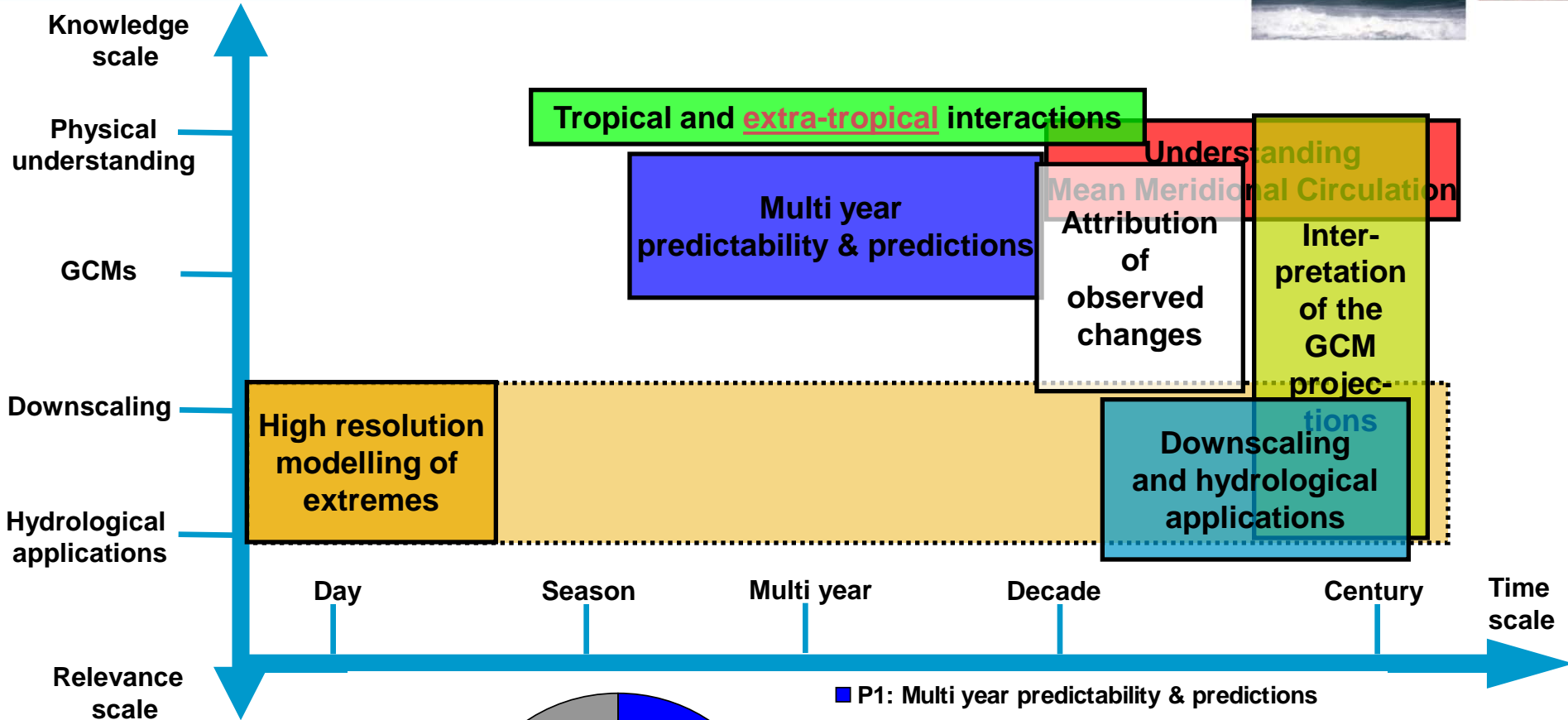


Composite inflow years
Based on the sign of the tripole
(positive = la Nina or Negative IOD)

Two distinct periods are considered
1910 to 1996
1997 to 2012

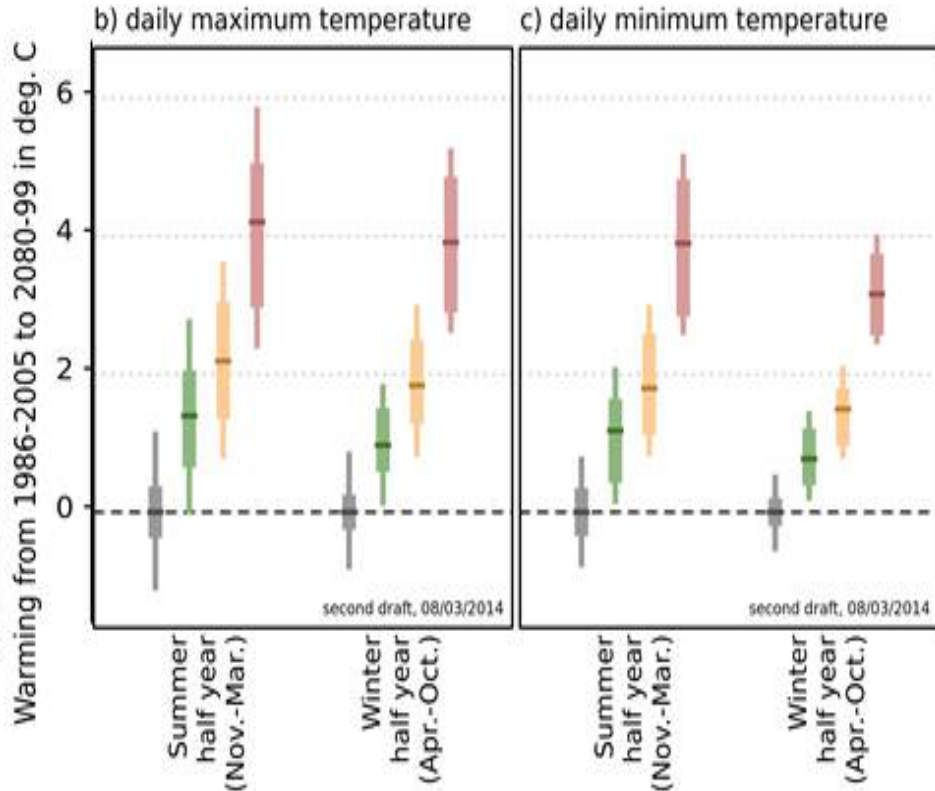
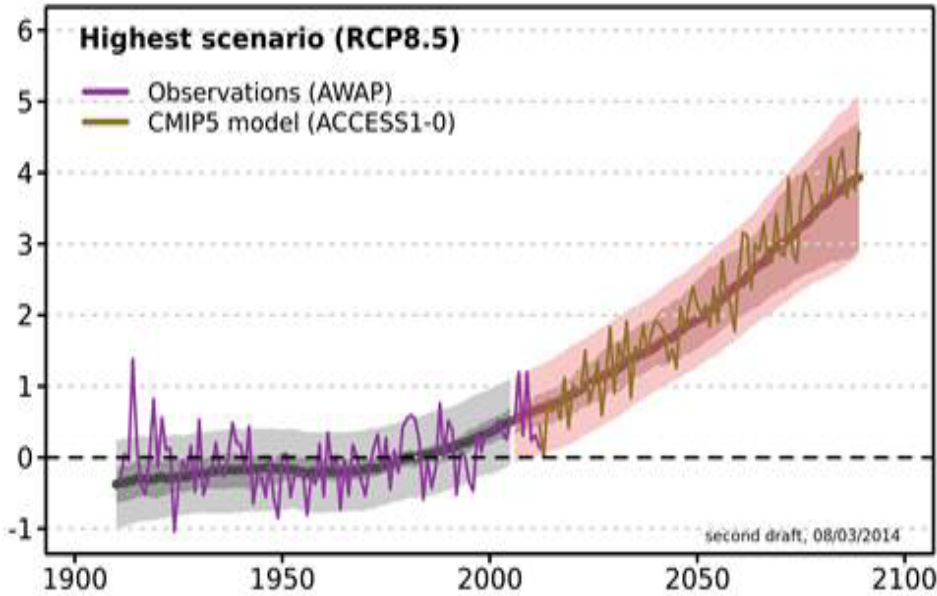


Overview of VicCI: 7 projects

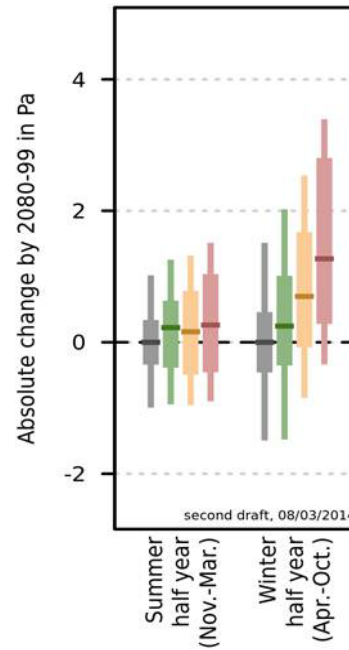
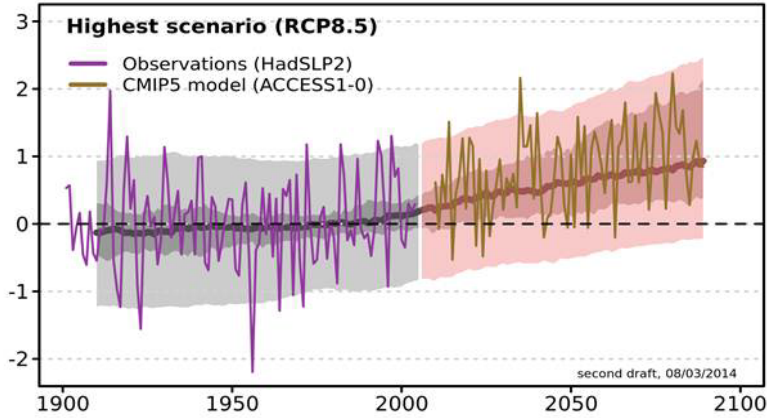


- P1: Multi year predictability & predictions
- P2: Changes in Mean Meridional Circulation
- P3: Tropical-extratropical interactions
- P4: Attribution of recent observed changes
- P5: Interpretation of GCMs' future projections
- P6: High resolution modelling of extremes
- P7: Downscaling & Hydrological applications
- Governance - Management - Communication

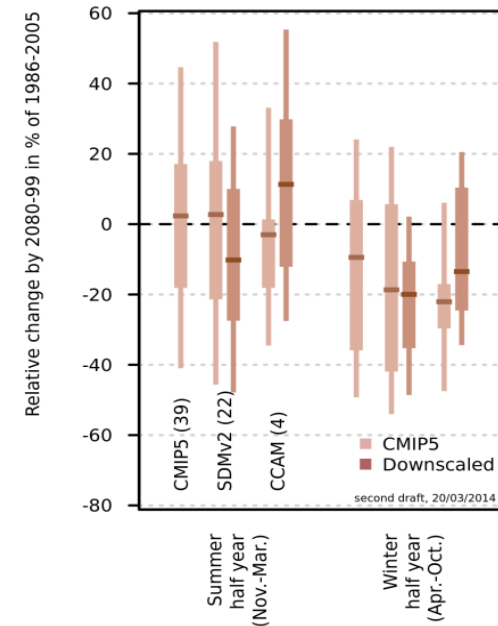
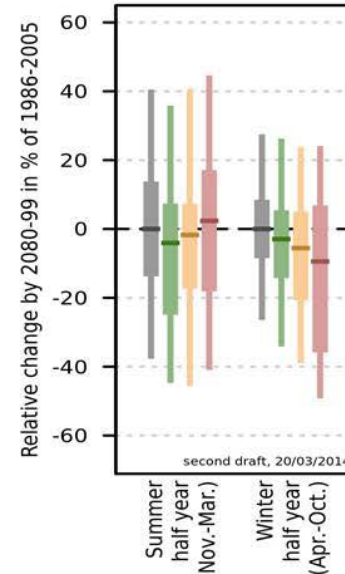
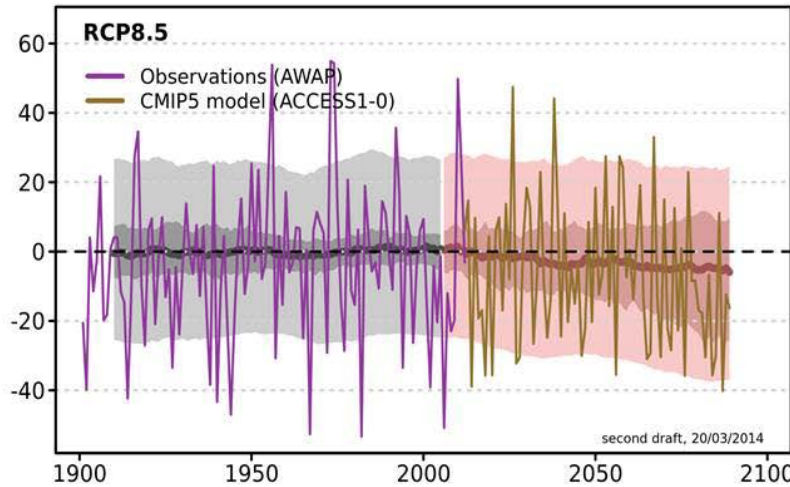
National Projection for NRM



MSLP projected changes



Rainfall projected changes



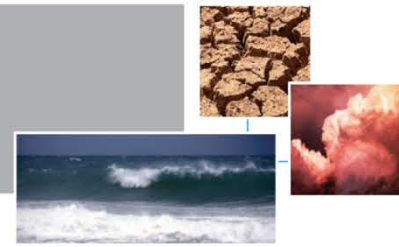
Further information



- Dr. Bertrand Timbal: b.timbal@bom.gov.au;
welcome to contact all scientists involved in VicCI
- VicCI web site (on-line soon): <http://cawcr.gov.au>
and existing SEACI web site: <http://www.seaci.org/>
- First annual report (released early August): CAWCR Tech. Rep. series
- NRM reporting due out in August 2014:
 - 2 clusters reports relevant to VicCI: Murray-Basin and Southern Slopes
 - Technical reports: climate variability and change science
 - Web site: National projections, application ready datasets
 - <http://www.climatechangeinaustralia.com.au/> (replacing 2007 release)



Project 1

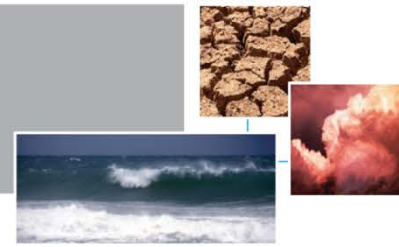


Multi year predictability & predictions:

- Team (BoM): Harry Hendon (PI), Eun-Pa Lim
Guo Liu, Jing-Jia Luo
- Diagnose Decadal Change in ENSO;
impact on predictability
- Explore impact of SST warming on extreme such as the
La Nina in 2010



Project 2



Observed changes in the Mean Meridional Circulation:

- Team (BoM): Bertrand Timbal (PI), Faina Tseitkin
Chris Lucas, Hanh Nguyen, Laurie Rikus
- Develop new method to evaluate the Hadley Circulation within the Australian region
- Evaluate relationship between several metrics of elements forming part of the HC



Project 3



Tropical-extratropical interactions:

- Team (BoM): Harry Hendon (PI), Hanh Nguyen, Eun-Pa Lim, Chris Lucas
- Analyse the MMC using an isentropic approach
- Investigate relationship between SAM and ENSO



Project 4



Attribution of recent observed changes:

- Team (BoM): Bertrand Timbal (PI), Faina Tseitkin
Chris Lucas, Hanh Nguyen
- Attribute observed tropical expansion to individual climate forcings (NH vs. SH contrast)
- Analyse HC expansion in CMIP5 simulations with anthropogenic and natural forcings



Project 5

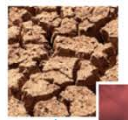


Interpretation of GCMs' future projections:

- Team: Bertrand Timbal (PI, BoM), Yang Wang (BoM)
Dewi Kirono (CSIRO), Janice Bathols (CSIRO)
- Inform VicCI of results from the NRM program relevant to Victoria
- Evaluate CMIP5 projections in respect to key features:
STR changes and Indo-Pacific tropical warming



Project 6



High resolution modelling of extremes:

- Team : Marie Ekstrom (PI, CSIRO)
- Set-up of the WRF model
 - Code on NCI
 - Model domain and size
 - Fine resolution surface data
 - Sensitivity to boundary layer and micro-physics schemes



Project 7



Downscaling & Hydrological applications:

- Team: Jin Teng (PI, CSIRO), Bertrand Timbal (BoM), Yang Wang (BoM)
- Investigate simple rainfall-runoff relationship in high yield catchment using high resolution gridded observations
- Review of possible bias corrections techniques needed to applied to downscaled rainfall series

