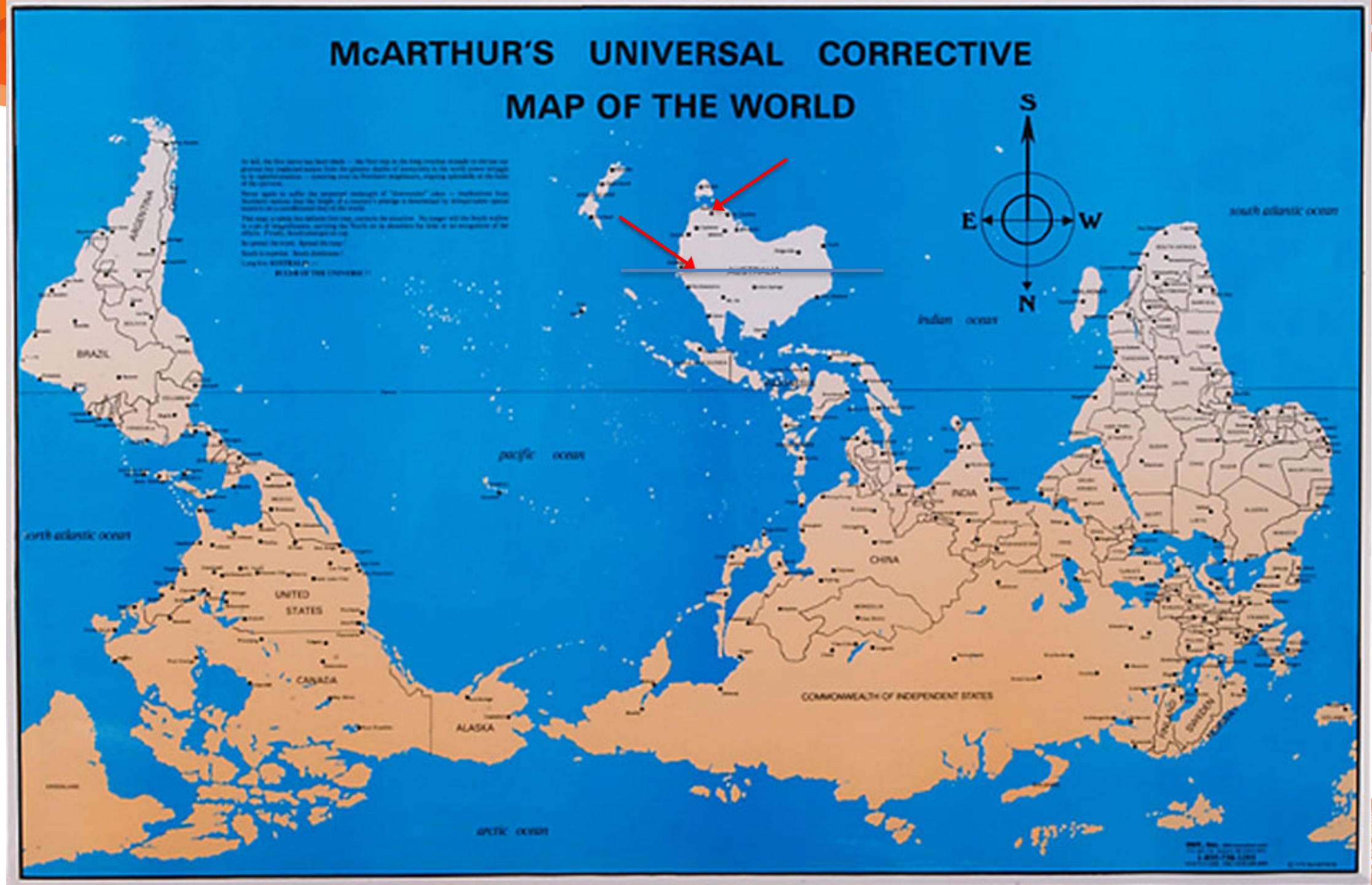
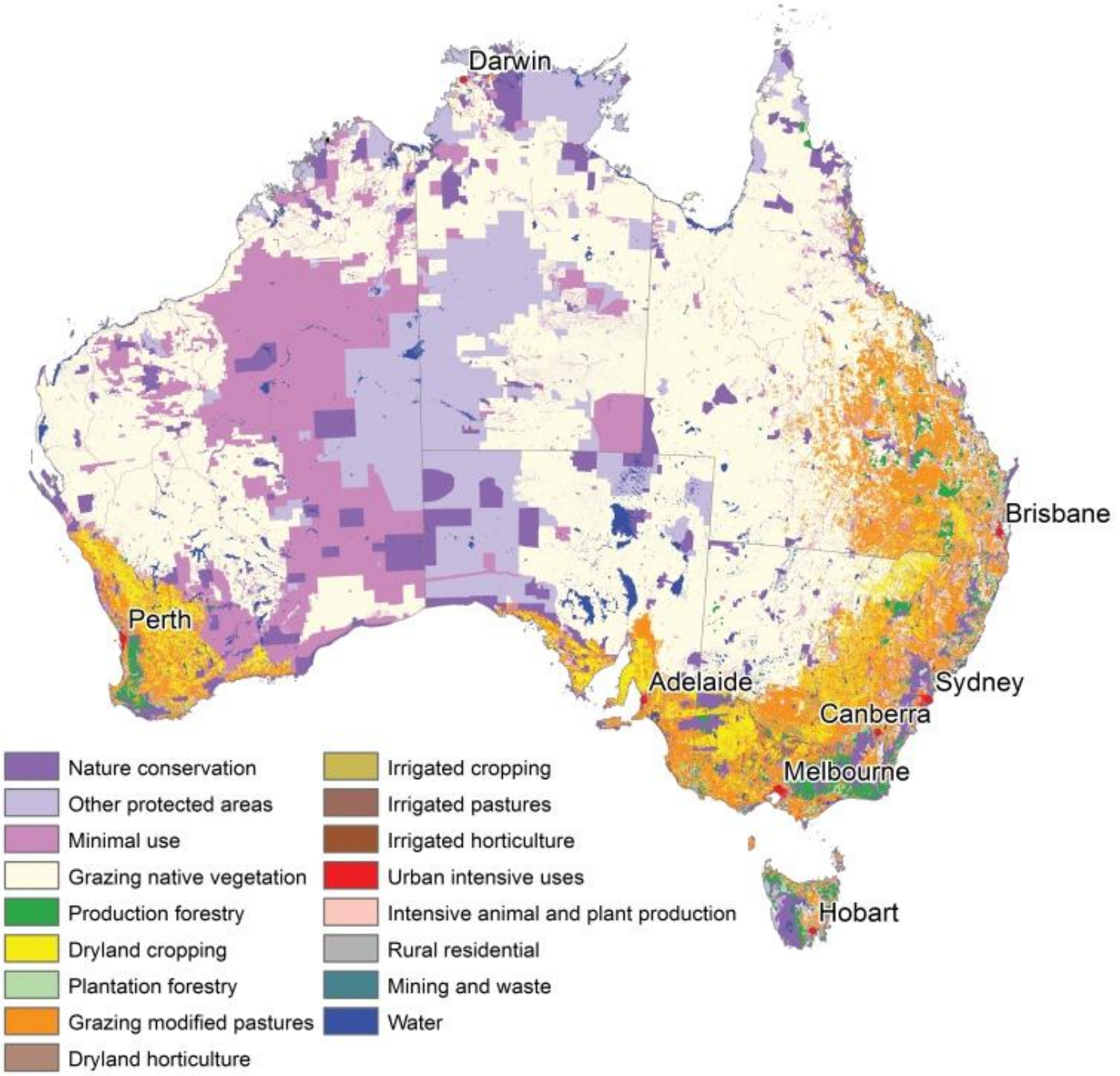
Drought research within the Northern Australia Climate Program (NACP)

Roger Stone
University of Southern Queensland

With its main funding from the beef industry

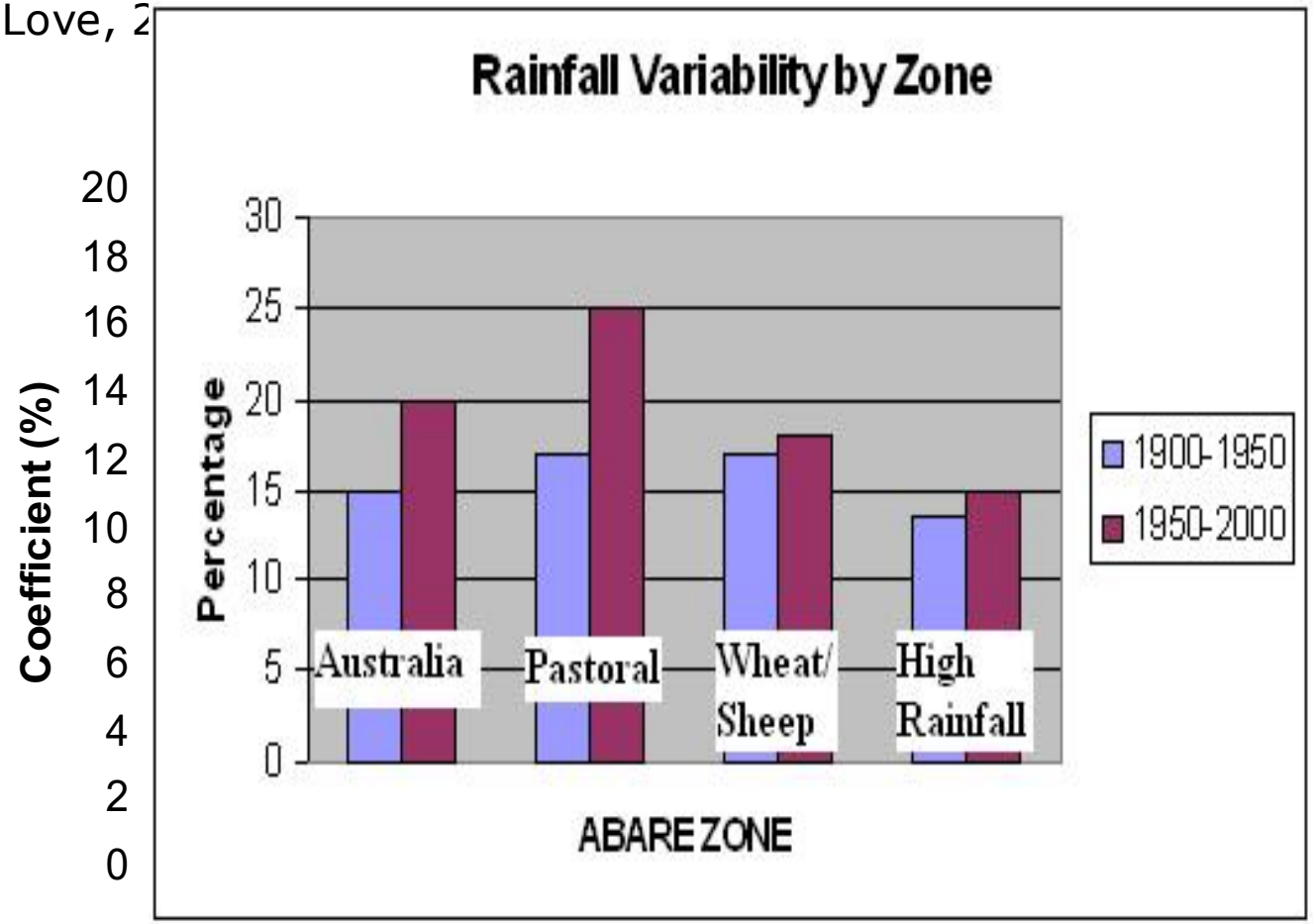

McARTHUR'S UNIVERSAL CORRECTIVE
MAP OF THE WORLD
S
E
W
N
south atlantic ocean
indian ocean
pacific ocean
south atlantic ocean
ARGENTINA
BRAZIL
UNITED STATES
CANADA
ALASKA
INDIA
CHINA
COMMONWEALTH OF INDEPENDENT STATES
arctic ocean

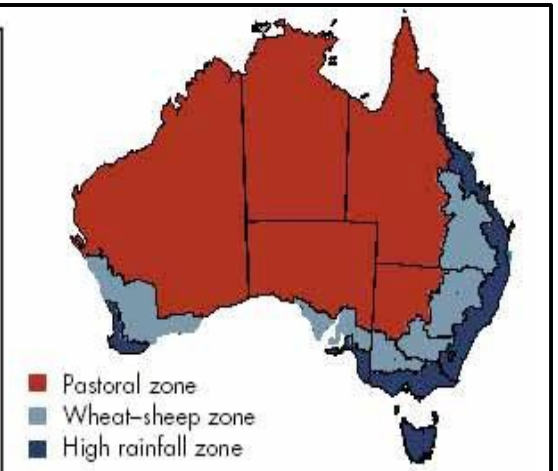
Northern Australia dominated by grazing of native vegetation

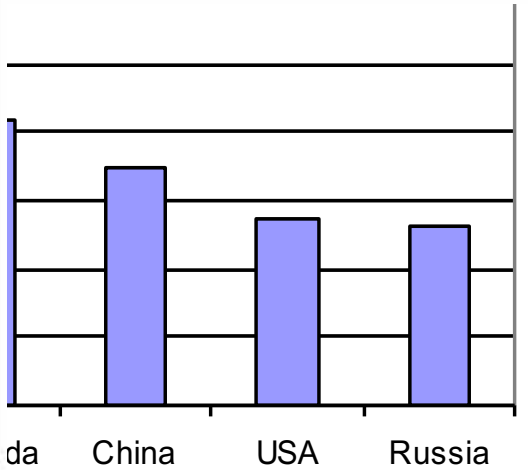


Climate issues dominate - Australia has a very high level of year to year climate variability

(Love, 2







The coefficient of variation is given by the standard deviation divided by the mean.

Love, G. 2005. *Impacts of climate variability on regional Australia*. Outlook 2005 Conference Proceedings, Climate Session Papers, ed. R. Nelson and G. Love. Australian Bureau of Agricultural and Resource Economics (ABARE).

Setting the context for NACP – results of a study of producer needs

Climate issue	RD&E action
Low and variable forecast skill	Improve climate model skill at multiple timescales Mapping forecast skill (by region and season)
Relevance of existing forecast systems and technologies	Longer forecast lead times (seasonal) Drought forecasts (multi-year) Forecasts of summer wet season Forecasts of onset, delays and end of wet season Region and local scale forecast products Forecasts of unseasonal rain in dry season Forecasts of extreme heat and flash drought
Use of climate resources and the technologies	Trained and supported local climate advisers Provide an integrated 'end to end' climate service targeted for the region Targeted, relevant and updated tools Climate advice by local advisers Integrating forecasts into management
Support from climate experts	Provide an integrated 'end to end' climate service with two way flow of engagement, information and evaluation
Proof of value	Case studies with producers (post-drought assessments, innovative management for reducing drought vulnerability, use of critical indicators and triggers for drought planning and the use of forecasts in better decision making) Integrated climate, biophysical and herd modelling to show forecast value.

NACP – 3 projects

Funding for 2018-2021

- NACP 1 'Research project':

Improving the basic science and operational skill of seasonal, sub-seasonal (multi-week) and multi-year climate forecasting systems of direct relevance to the northern Australia red meat industry

- NACP 2 'Development Project'

Developing innovative and targeted products for use in drought monitoring, planning and prediction for producers and policy makers

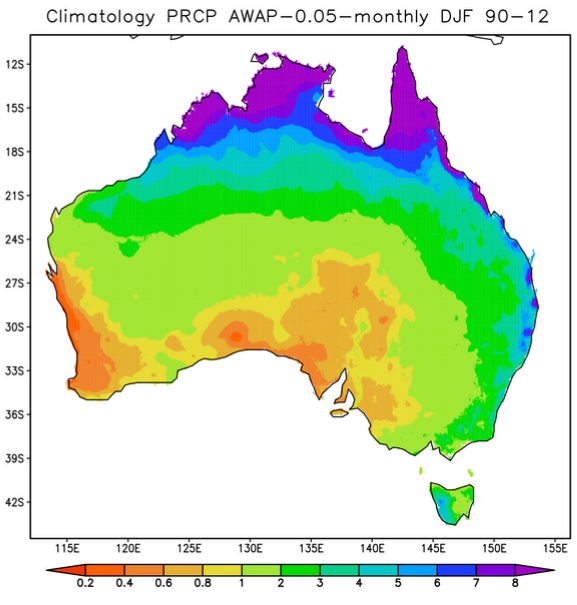
- NACP 3 'Extension Project'

Integrating and embedding climate forecast information into Northern Australia grazing industry networks to improve producer resilience to drought and climate variability

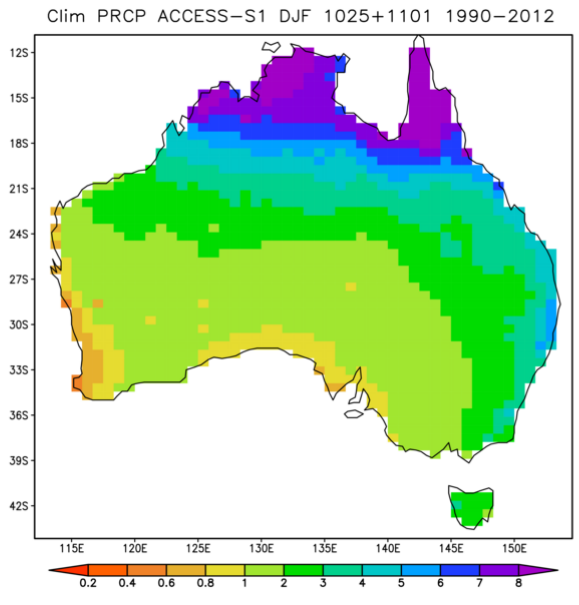
Representation of Australian climate in our forecast models

Example: Rainfall (mm/day) climatology for the summer (DJF) season

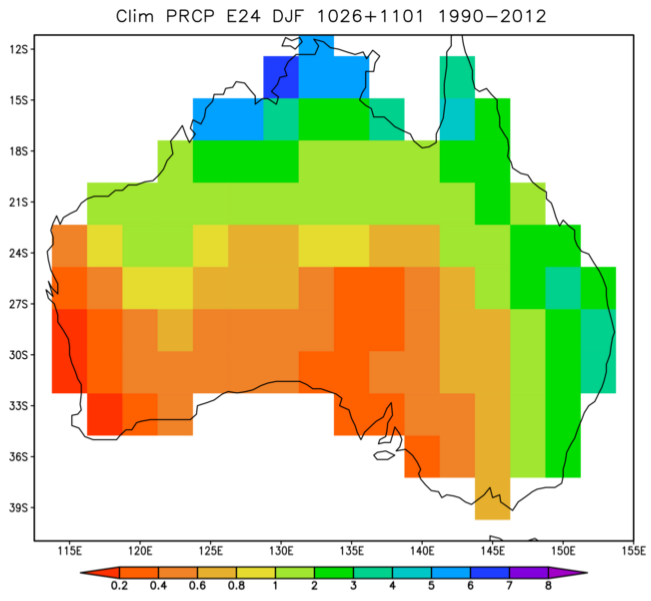
Observation



ACCESS-S1



POAMA



The dynamical forecast system underpins all of our prediction work.

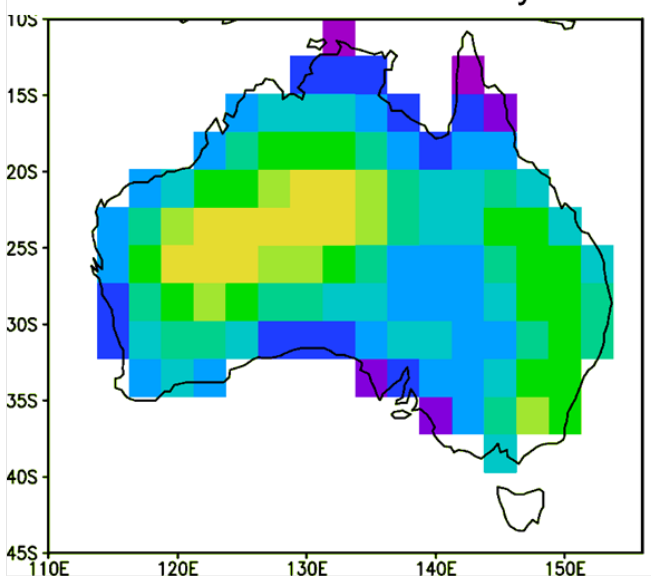
Enhanced resolution for the atmosphere and land with ACCESS-S

Topography

Grid resolution increase from 250 km to 60 km
Able to resolve Dividing Range, Tasmania, coastal zone

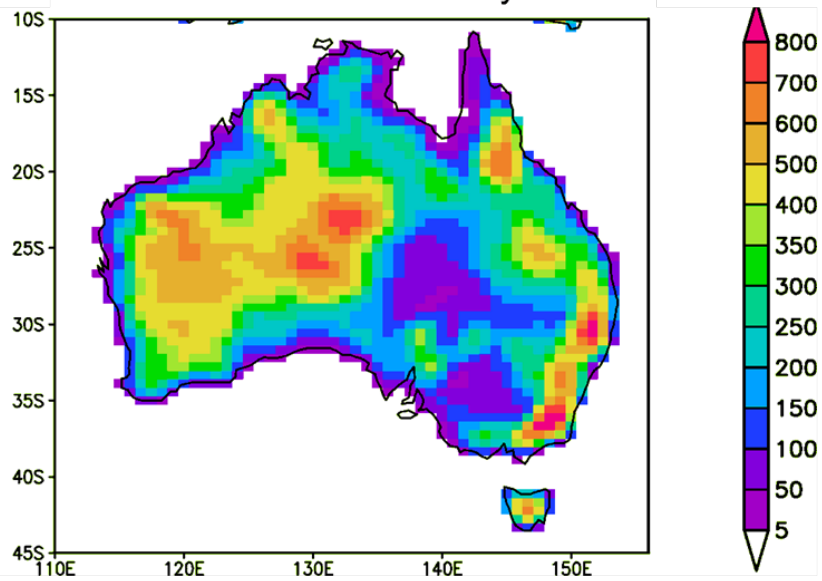
POAMA-2

Current 250 km resolution system



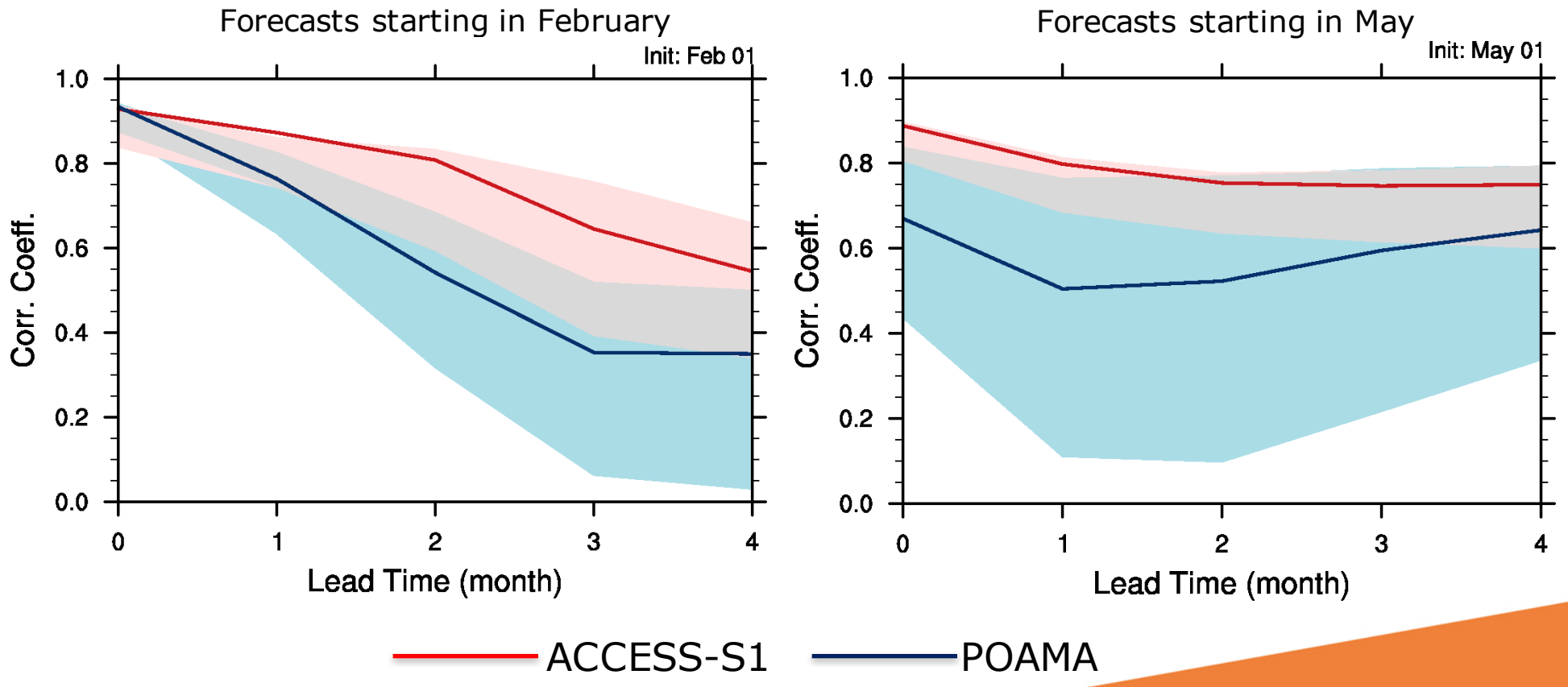
ACCESS-S

New 60 km resolution system



Prediction of ENSO in our forecast models

Correlation skill of forecasts of sea surface temperature in the eastern Pacific (NINO3)



ACCESS-S plans

Unfixed timeline

ACCESS-S1

Operational May 2018

- UKMO global coupled model (GC2)
- Uses UKMO initial conditions
- BoM-developed ensemble generation
- Larger ensemble size than UKMO
- Forecasts out to 6-months lead time

ACCESS-S2

Operational start 2019

- BoM-developed state-of-the-art forecast initialisation
- UKMO global coupled model (GC2)
- Forecasts out to 3-years lead time

ACCESS-S3

Operational in mid 2021

- Improved global coupled model (GC4/5)
- Further improvements to the forecast initialisation

ACCESS-S4

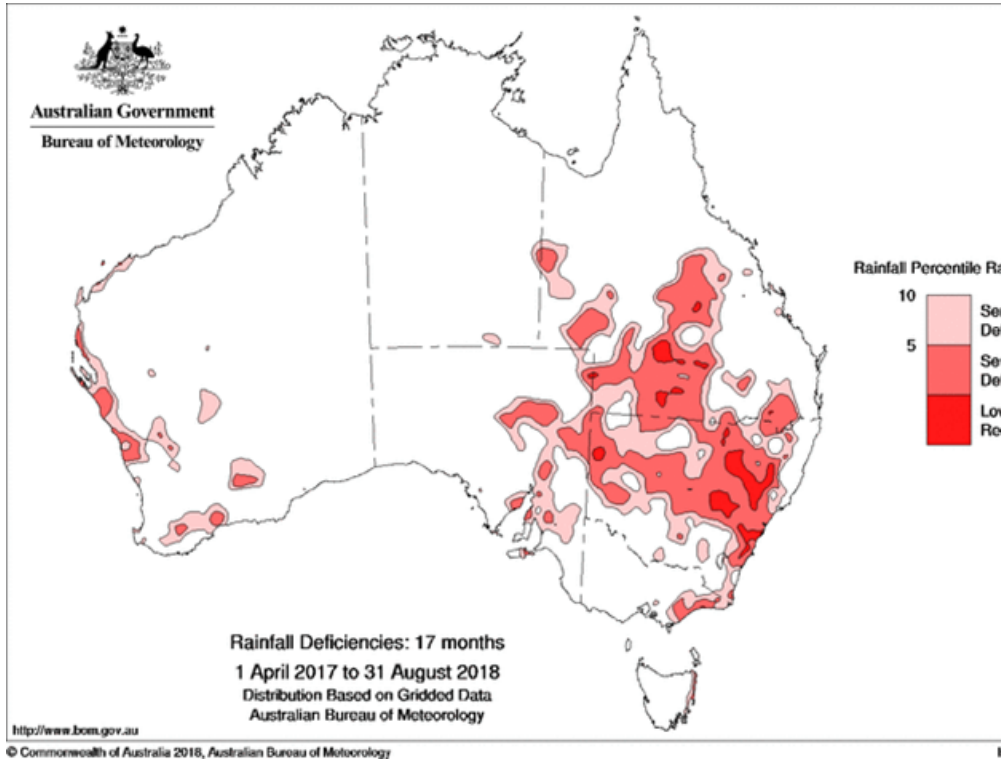
Early 2023

Drought work being conducted in NACP

- Drought indices (USQ)
- Australian Drought Monitor (USQ)
- Flash Drought monitoring and prediction (BoM)
- Multi-year drought prediction (BoM)

All this work is at a very preliminary stage.

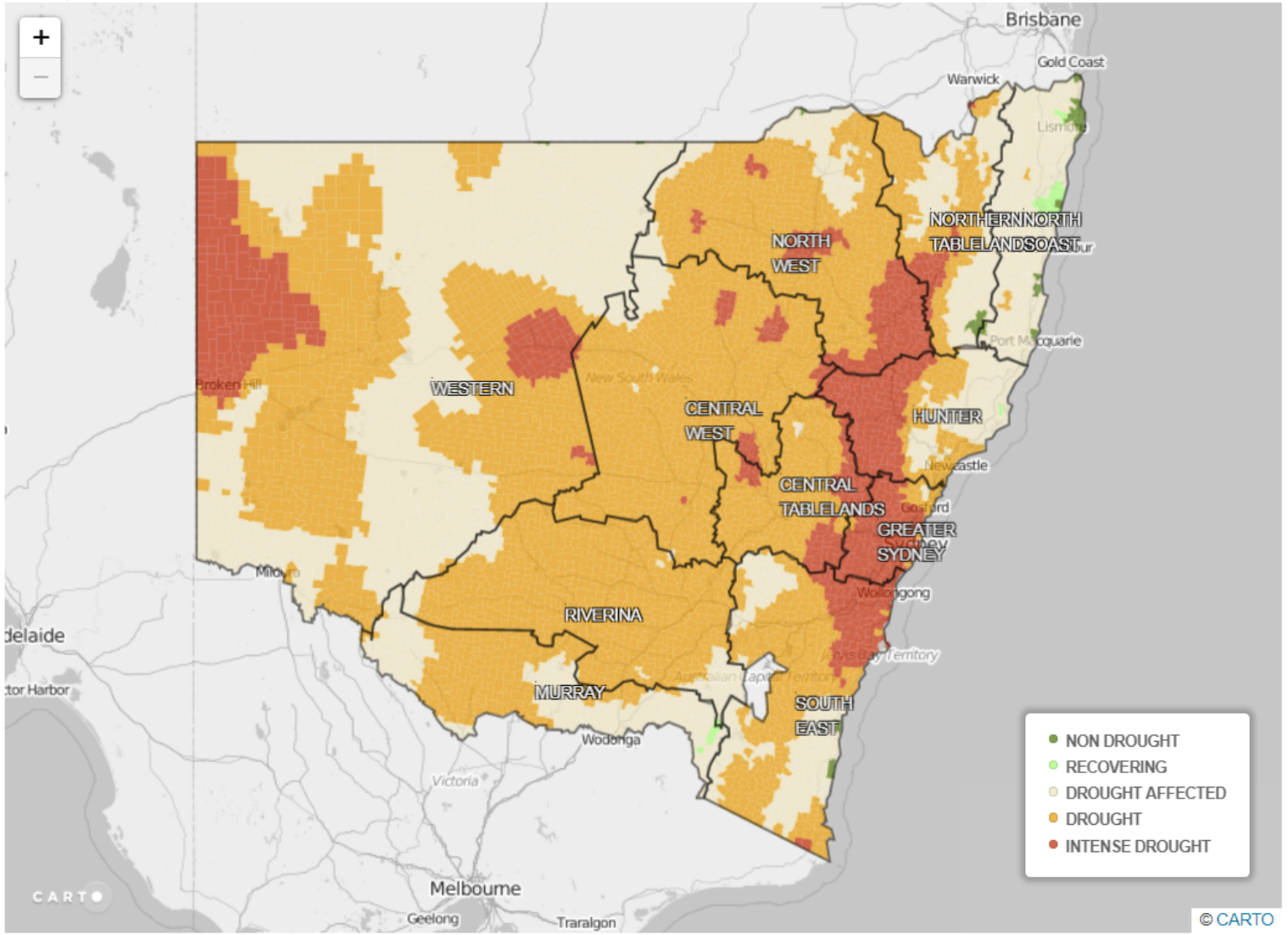
What is currently available for drought monitoring in Australia



QUEENSLAND DROUGHT SITUATION

As reviewed on **4 September 2018**,
there are a total of **23 councils** and **4 part council areas** drought-declared.
These declarations represent **57.4%** of the land area of Queensland.

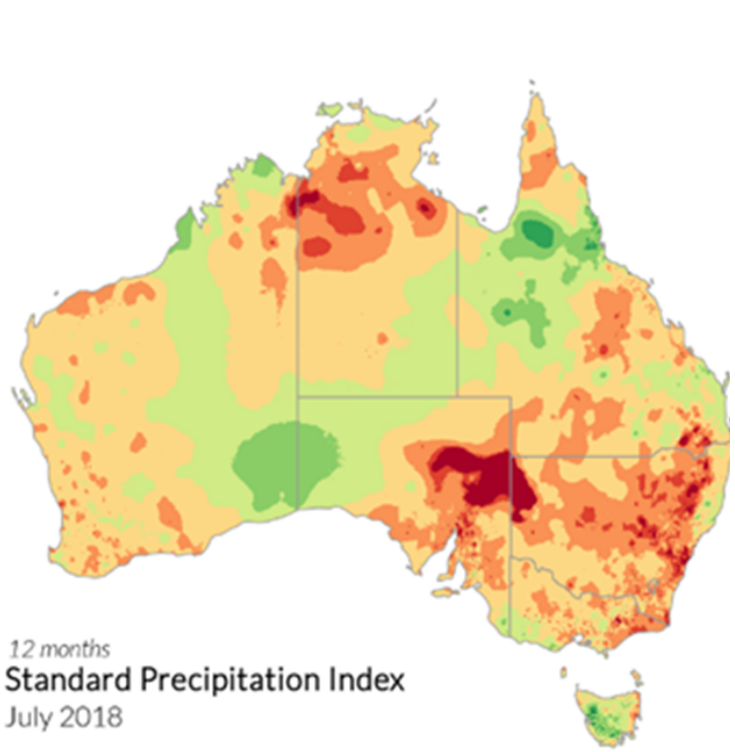
Last updated on 06/9/2018, 3 AM

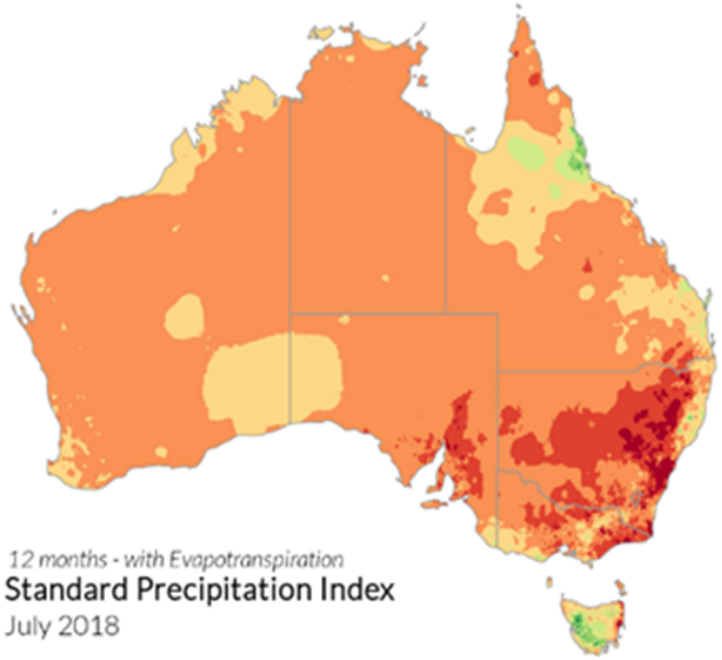


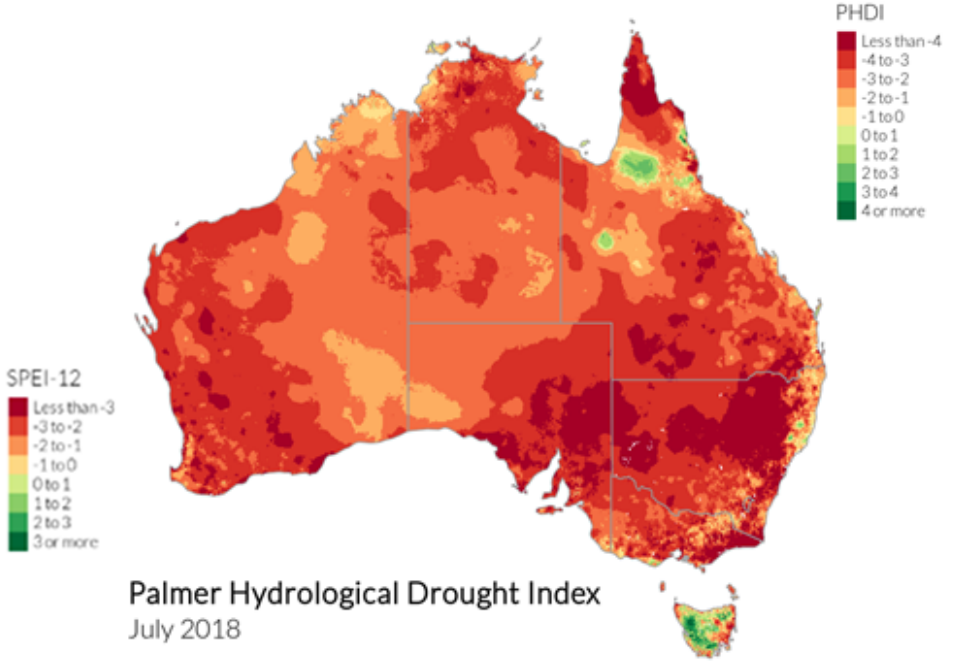
CDI = Combined Drought Indicator. RI = Rainfall Index. SWI = Soil Water Index. PGI = Pasture Growth Index. DDI = Drought Direction Index

Australian Drought Monitor

Being modelled on the USDM with advice from Mark Svoboda. First step is to compute and examine multiple drought indices.





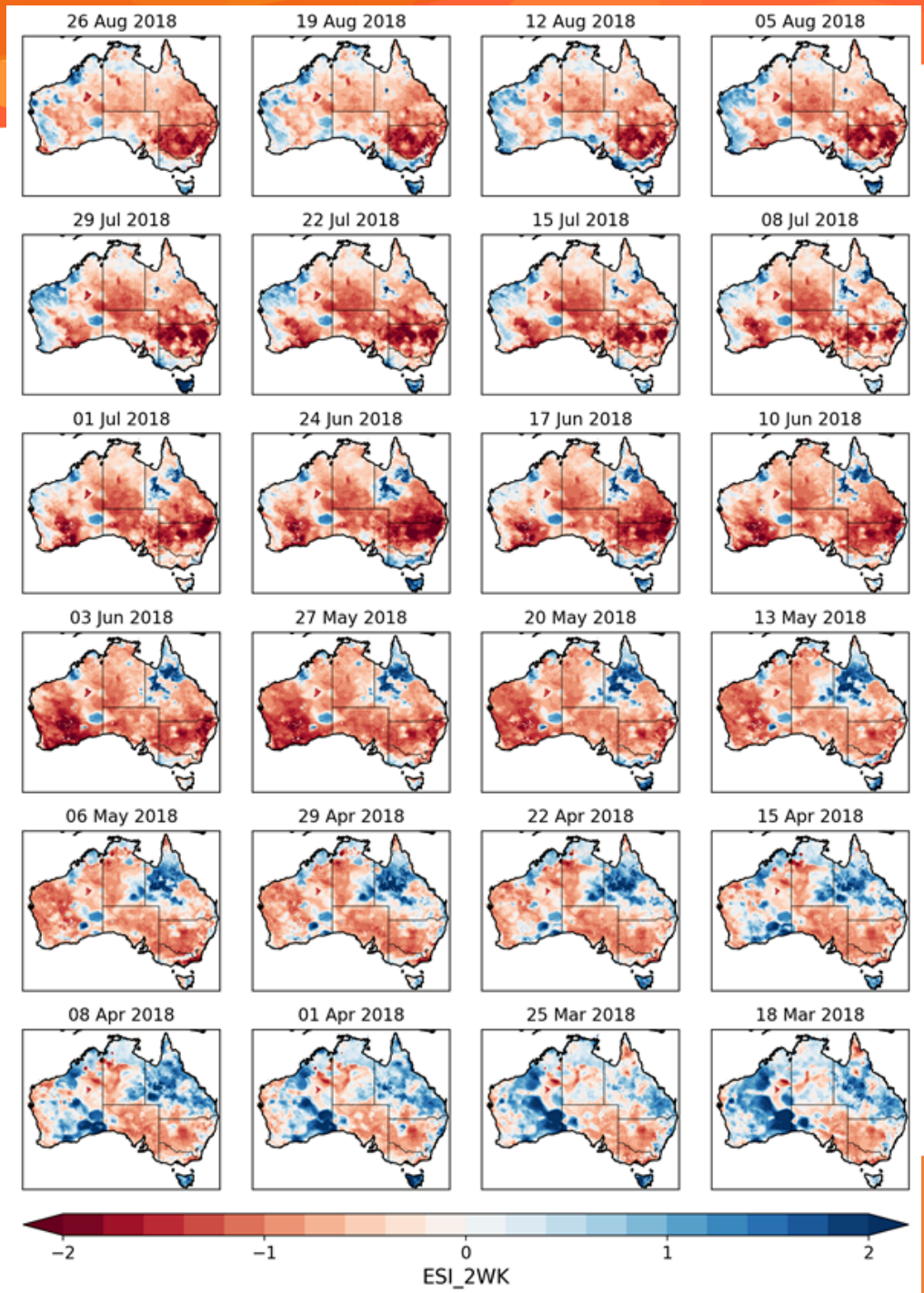


This work is being done by the University of Southern Queensland

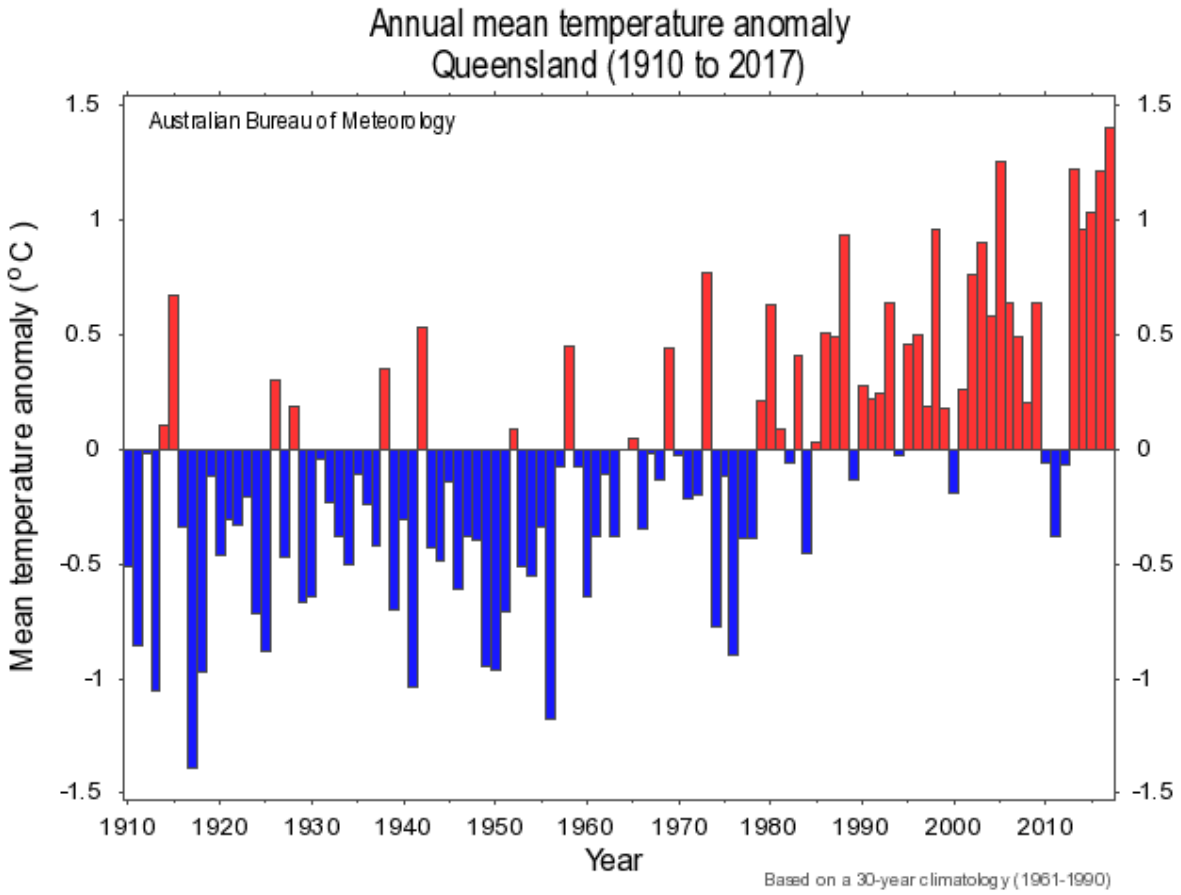
Flash drought

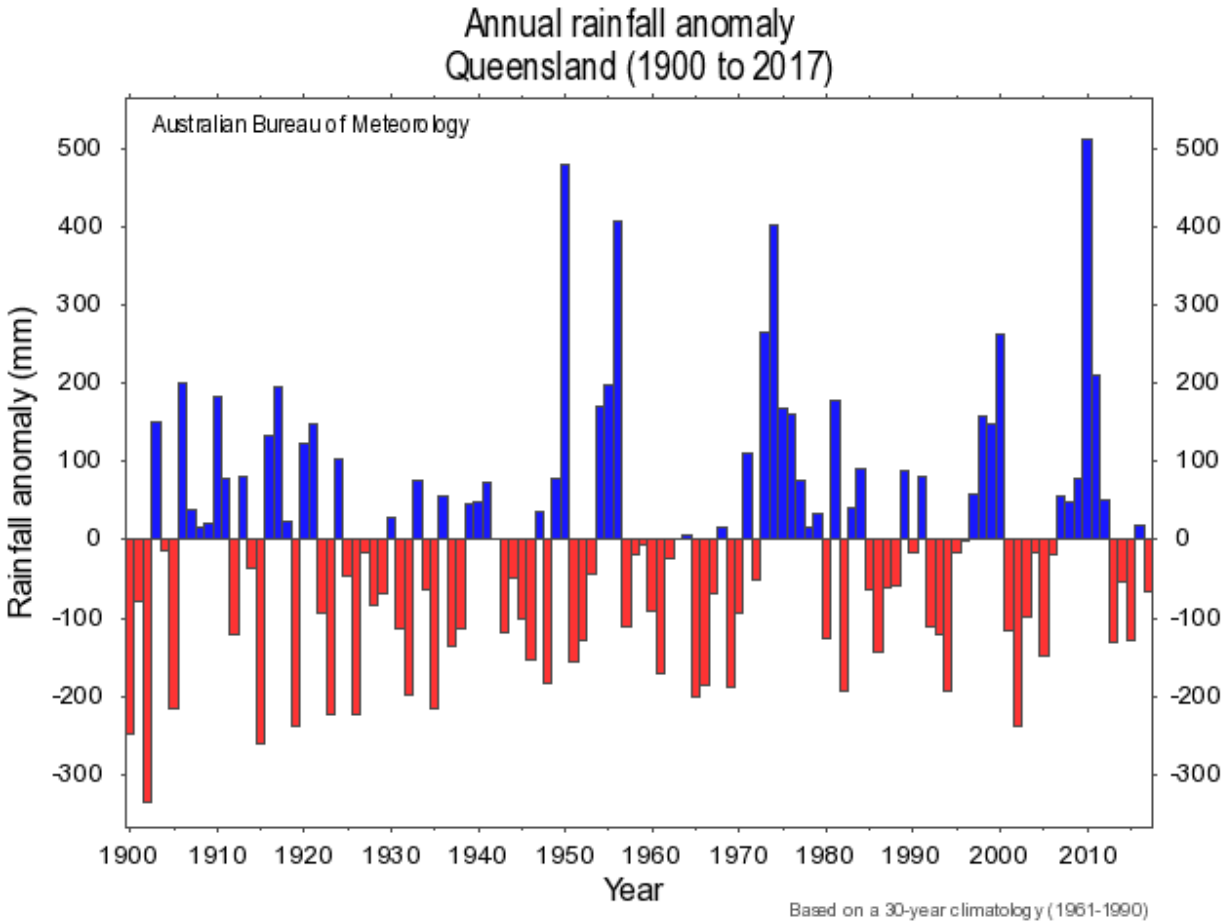
(See Matt Wheeler's talk on Thursday)

This work is being done by Hanh Nguyen and Matthew Wheeler and the Bureau of Meteorology



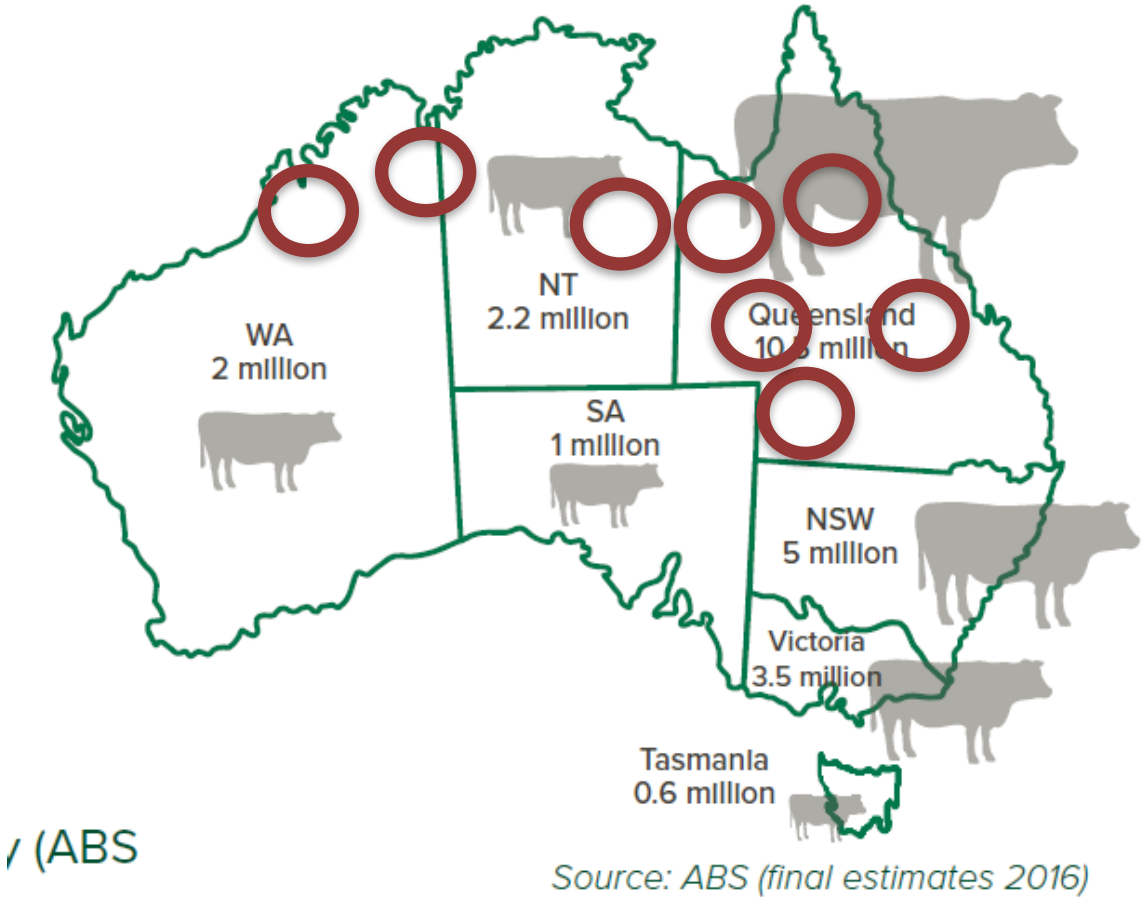
Multi-year drought





This work is being done by Sharmila Sur and Harry Hendon at the Bureau of Meteorology

Locations of 'climate mates'



/ (ABS

Source: ABS (final estimates 2016)

Australia: 25M head cattle
$17B
North: 13.8M head or 55% of national herd

Need to move beyond 'passive engagement' and reliance on web sites – need to move from 'simple awareness' to 'active engagement'.

Thank you

Roger.Stone@usq.edu.au

Matthew.Wheeler@bom.gov.au

There will be sessions on drought and climate applications at this conference in June 2019

AMOS ICTMO 2019
DARWIN AUSTRALIA