Department of Agriculture and Food
GOVERNMENT OF WESTERN AUSTRALIA

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Bureau of Meteorology climate forecasting - the move to POAMA modelling

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Bureau of Meteorology

25 February 2013

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This talk?

- Current Seasonal Outlooks
- Dynamical Climate Forecasts
- The Future for Climate Forecasts

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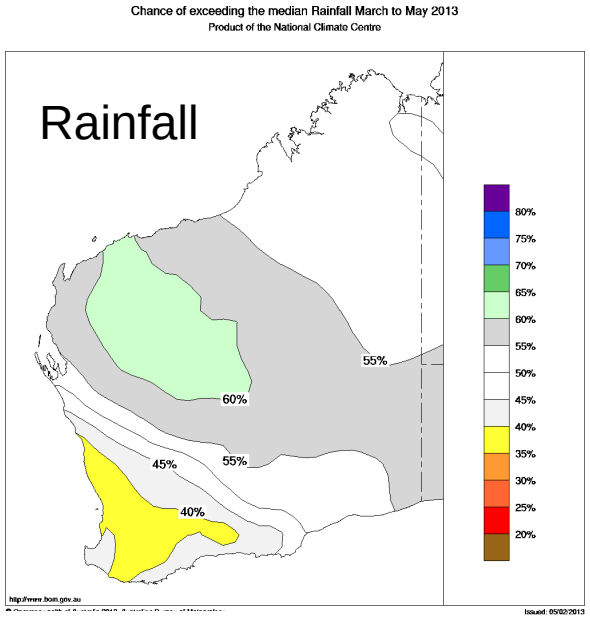
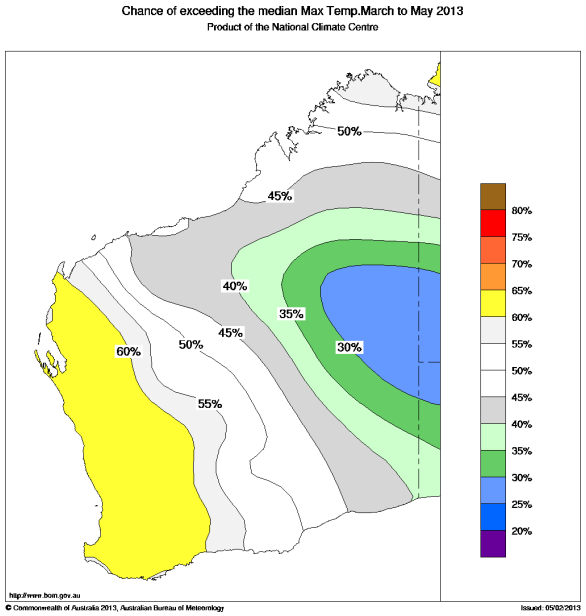
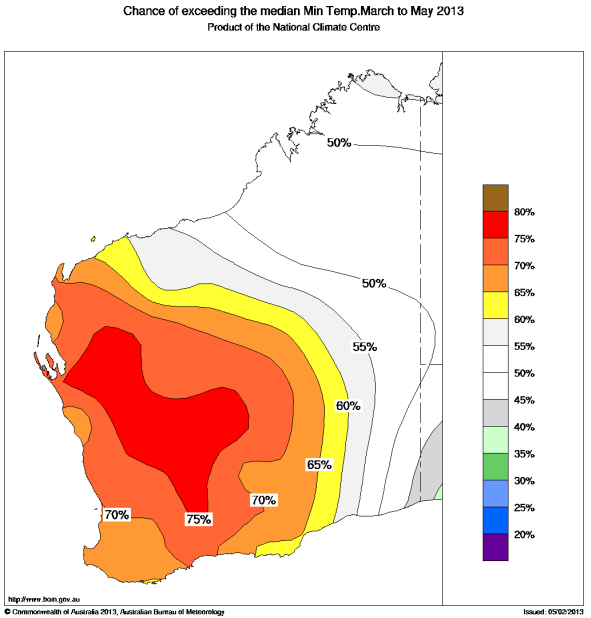
Seasonal Climate Outlooks





Maximum Temperature



Minimum Temperature

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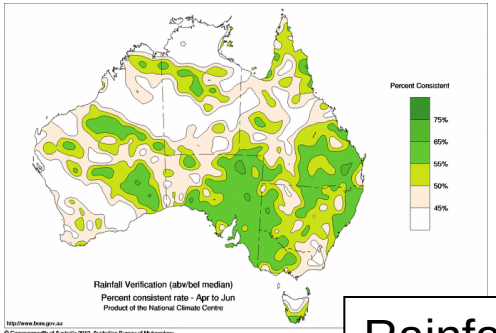
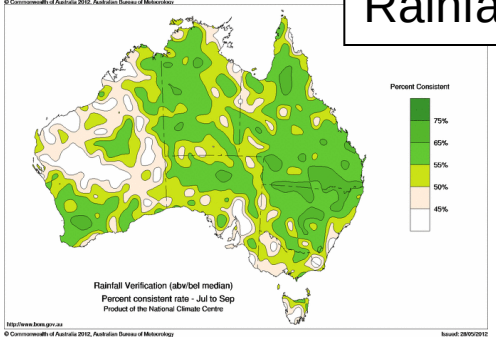
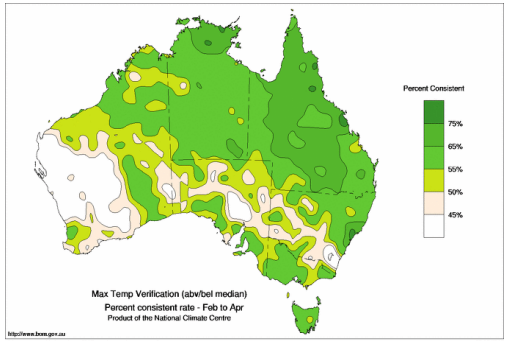
Seasonal Climate Outlooks skill?

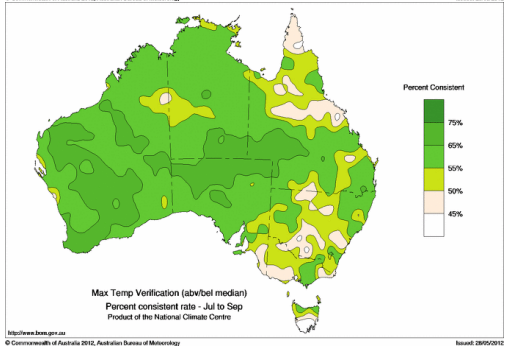


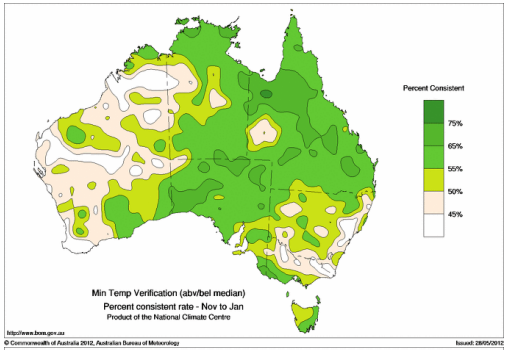
Rainfall

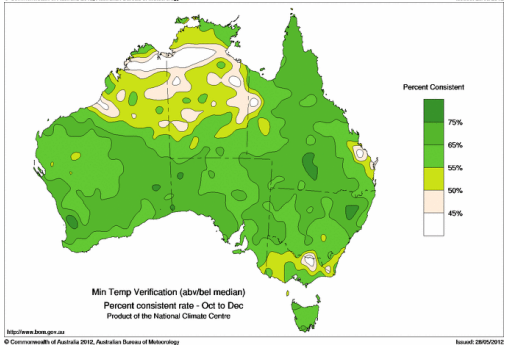


Maximum Temperature









Minimum Temperature

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Seasonal Climate Outlooks

a brief history at the Bureau

- 1907 to late 80s - 80 years of trying!
- 1989 – Rainfall based on SOI **(Southern Oscillation Index)**
- 1998 – Based on Sea Surface Temperatures
- 2000 – Temperature Outlooks commence

Current scheme has operated ~ 15 years

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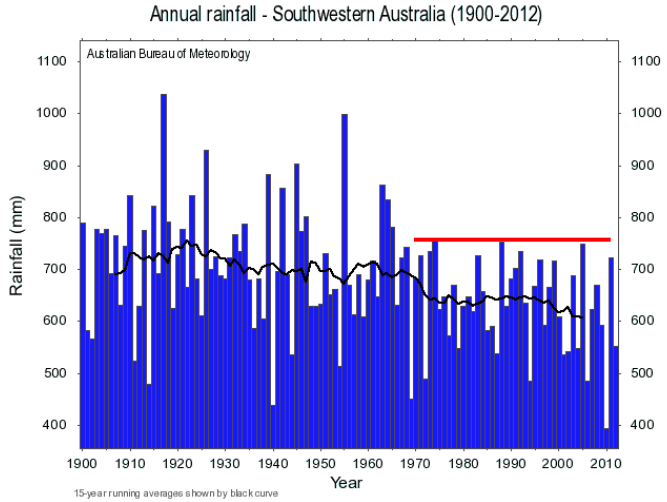
Seasonal Climate Outlooks
Statistical Schemes

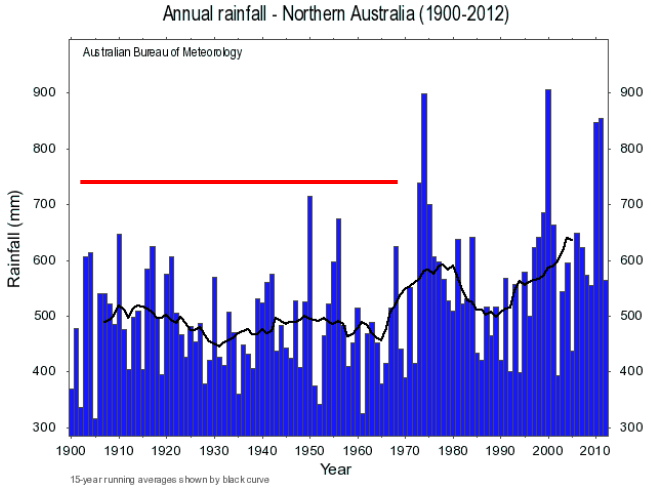
- The current Bureau scheme uses past data (statistics) to try to predict future climate
- This can only work if:
  - There is a good relationship between the predictor (SSTs) and the predictand (rainfall/temperature)
  - There is little or no change to the relationship

Seasonal Climate Outlooks

Statistical Schemes

But?





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Statistical forecasts have trouble predicting what they haven't seen before!

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Seasonal Climate Outlooks

Statistical Schemes

- There are concerns about the Bureau's current scheme because there is significant evidence that Australian climate has changed
- There is little likelihood that further research will significantly improve the skill (and in fact the skill will likely decline)

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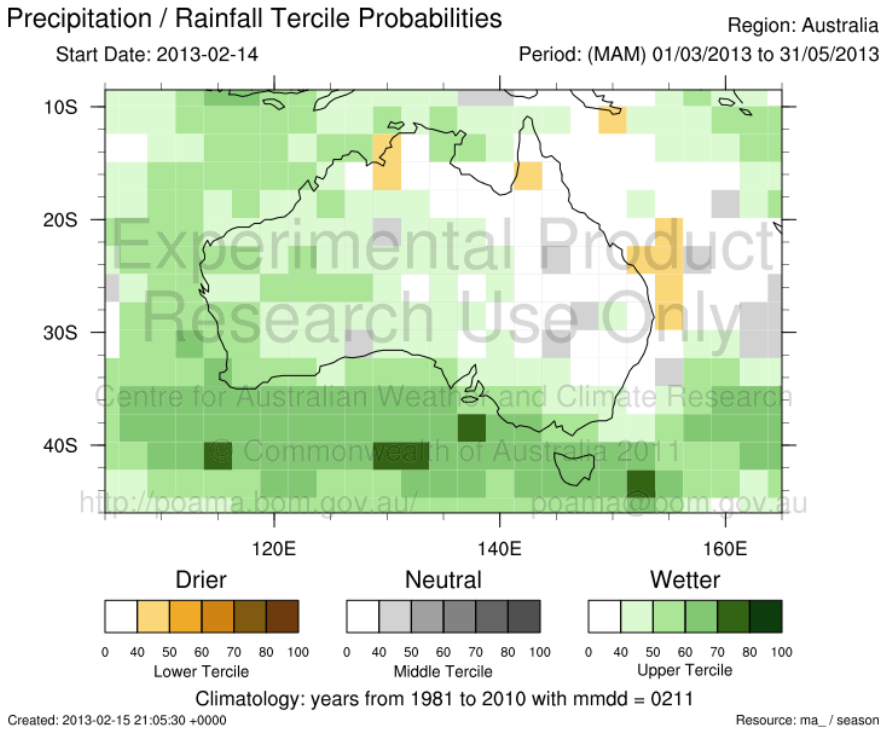
Seasonal Climate Outlooks

Well where to now?



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Dynamical Climate Forecasts

Dynamical Climate Models

- Similar to weather forecast models but run at lower spatial resolutions and longer time-steps (days instead of hours)
- Incorporate our knowledge of the physics of the atmosphere and oceans
- Can make predictions for periods of weeks/months/seasons
- Can include greenhouse gases (climate change predictions), chemistry (ozone layer), etc.

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Dynamical Climate Forecasts

Predictive Ocean Atmosphere Model for Australia (POAMA)

- Under development over the past 10 years
- Currently producing El Nino Southern Oscillation (ENSO) and Great Barrier Reef coral bleaching forecasts operationally
- Experimentally producing climate forecasts for Australia: http://poama.bom.gov.au/

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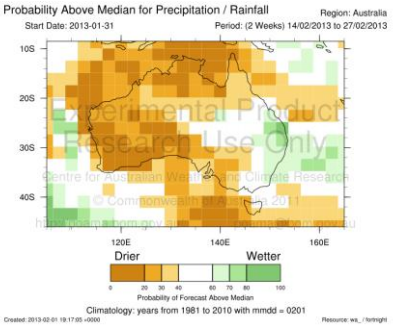
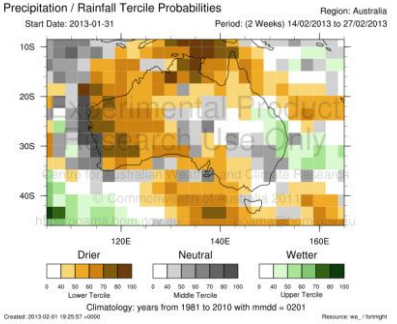
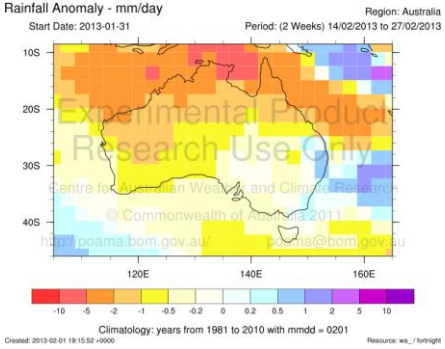
POAMA

- Forecasts produced weekly
- Rainfall, Maximum & Minimum Temperature, Pressure, OLR (Cloud), etc.
- 1, 2, 3 weeks; 1, 2, 3 fortnights; 1, 2, 3 months; 1, 2, 3 seasons
- Probabilities (above median, terciles) and mean anomalies (amount ↑ or ↓ average)







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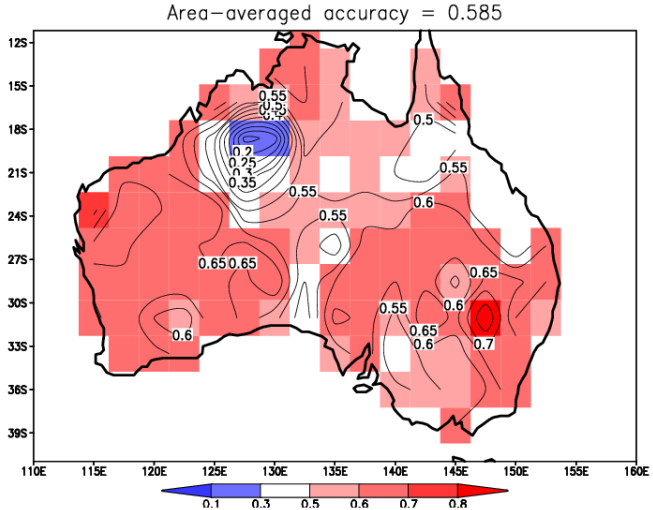
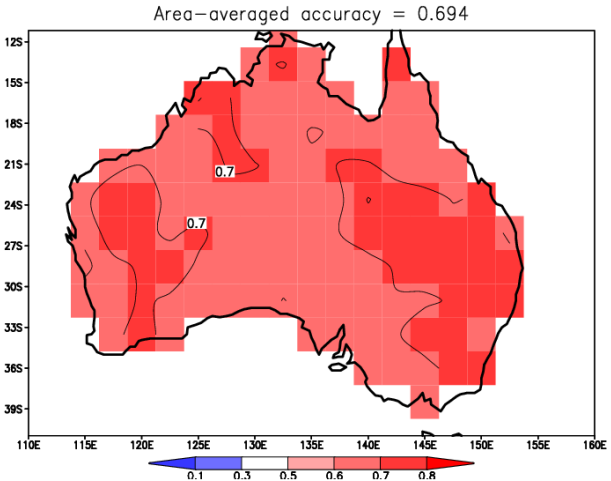
POAMA
Skill?

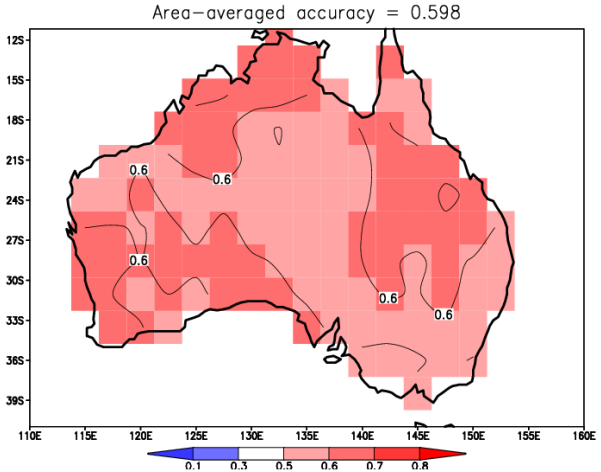
Week 3 & 4 June rainfall
(% consistent)



Month 1 (any month)
maximum temperature
(% consistent)



Season 1 (any season)
minimum temperature
(% consistent)



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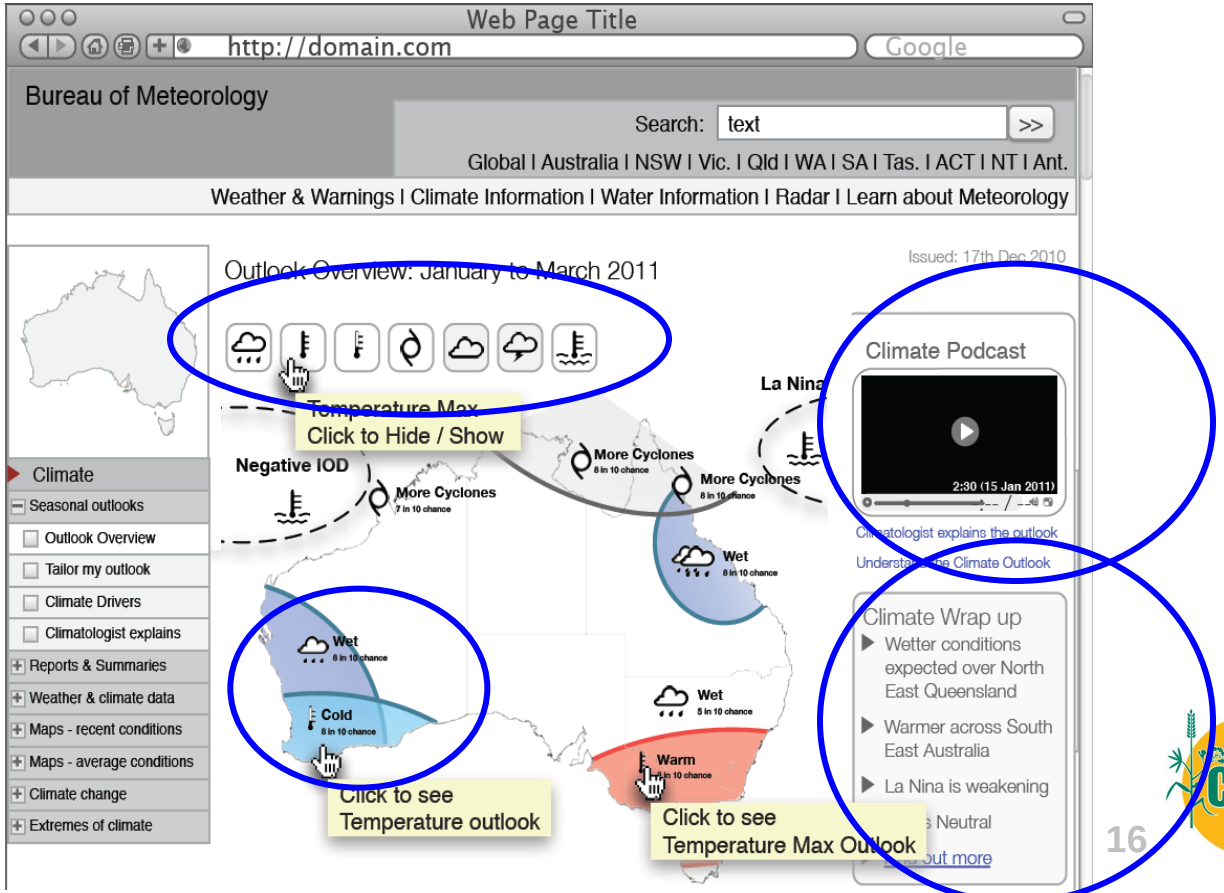
POAMA
Skill?

- Useful skill is being observed
- Skill is beginning to exceed that of the current Seasonal Climate Outlooks
- Future developments with POAMA are very likely to improve skill further (just like we have seen with weather forecast models)

Future of Climate Forecasts

- Bureau will adopt POAMA as the basis of its climate forecast scheme and retire the statistical scheme (in the next 12 months?)
- More tailored user friendly products will replace the current products based on extensive user consultation

Future of Climate Forecasts



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Key messages

- Dynamical climate forecasts have the potential to provide more useful and increasingly skilful products with obvious financial benefits
- They are the future of climate forecasting
- POAMA is expected to become the basis for the Bureau's climate forecast system within the next year or so

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Questions?

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