



Seasonal forecasting in Australia and the South Pacific

APEC Climate Center (APCC) Member Working Group Meeting
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Acknowledgements

David Jones, Oscar Alves, Brad Murphy, Matt Wheeler, Harry Hendon, Eun-Pa Lim, Janita Palahad

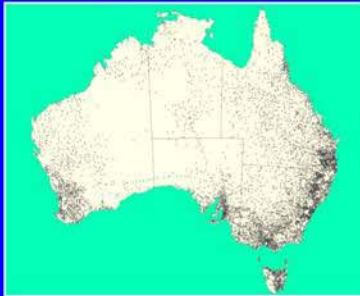


Overview

- The Australian Bureau of Meteorology's current operational climate prediction activities and update of prediction service
- Climate prediction for the Pacific Islands
- Why switch to a dynamical forecast?
- Australian Bureau of Meteorology CGCM – POAMA1.5
- Prediction of extremes

SEA TEMPERATURE (SST) - BASED EMPIRICAL SEASONAL PREDICTION

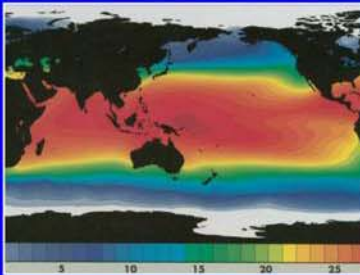
AUSTRALIAN RAINFALL DATA 1949 - 99



AUSTRALIAN TEMPERATURE DATA 1949 - 99



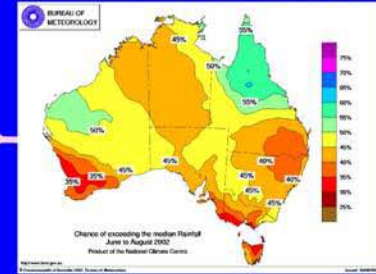
HISTORICAL SST 1949 - 99



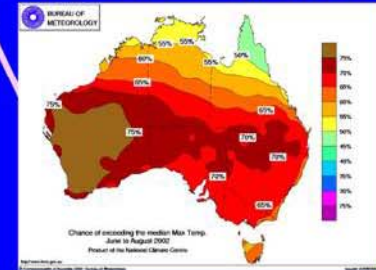
STATISTICAL RELATIONSHIPS BETWEEN SST PATTERNS AND AUSTRALIAN TEMPERATURES AND RAINFALL

STATISTICAL PREDICTION SCHEME

RAINFALL PROBABILITIES

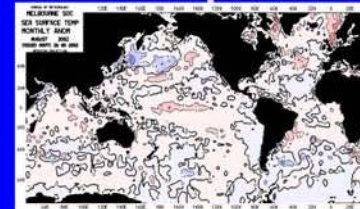


TEMPERATURE PROBABILITIES



PRINCIPAL COMPONENT ANALYSIS

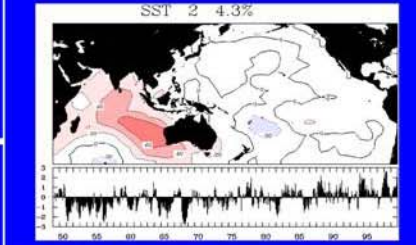
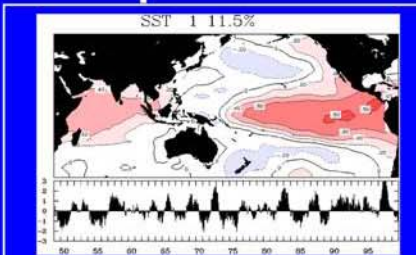
RECENT SST PATTERNS



PROBABILITY TABLES

Township Rainfall Outlook Probabilities

Town	33rd percentile conditions (mm)	Probability of "dry" conditions %	67th percentile conditions (mm)	Probability of "wet" conditions %
Western Australia				
Albany	317	45	343	23
Balfour Downs	9	34	13	33
Balladonia	52	41	78	26
Broome	3	37	39	30
Burbury	424	40	478	22
Carnarvon	83	35	117	32
Carnegie	6	34	41	33
Corigin	146	49	188	20
Cue	49	15	79	31

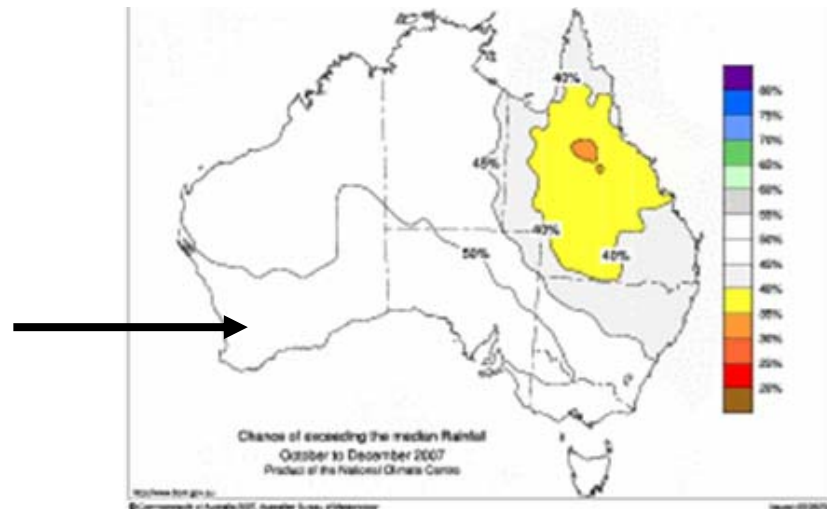
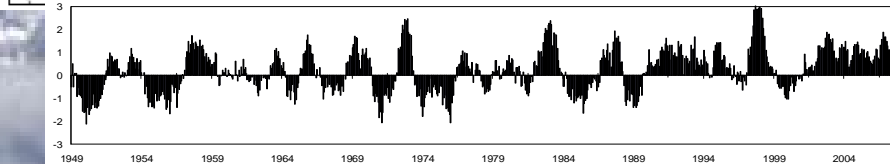
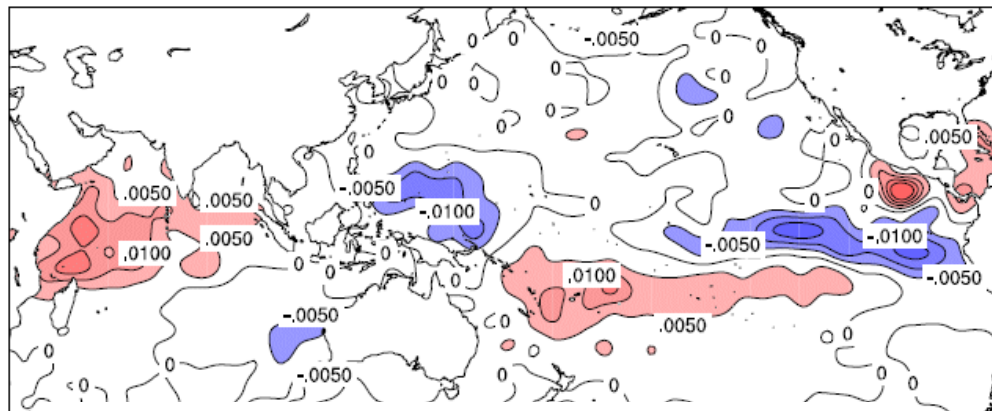


CHARACTERISTIC SST PATTERN

Update of statistical forecast

EOF1 contribution to OND above median rain forecast

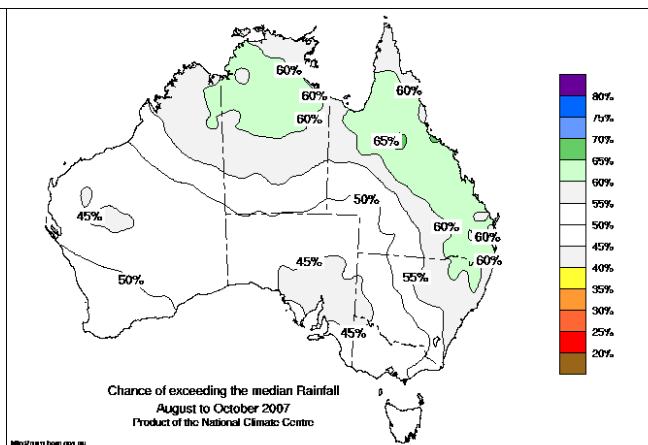
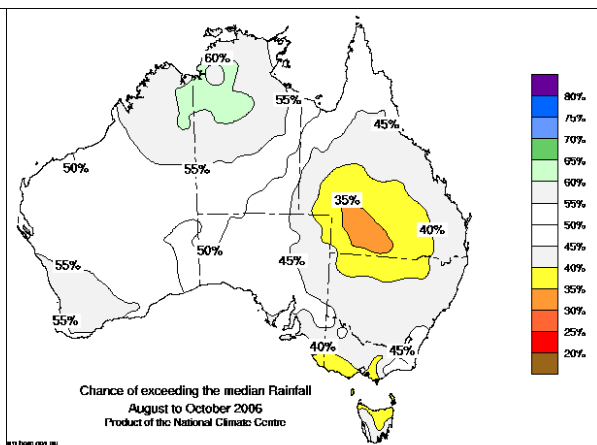
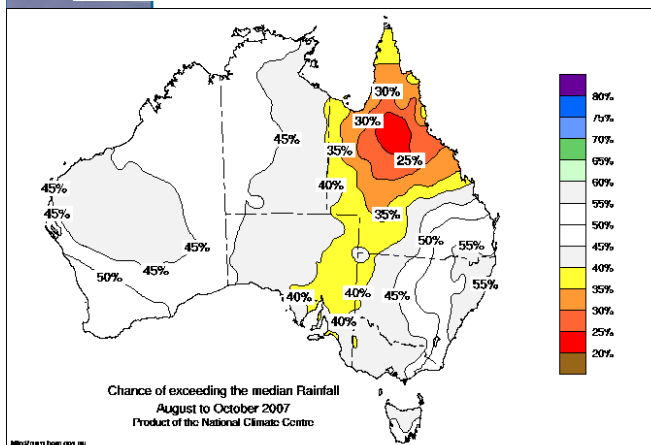
August EOF 1 weights –still positive



Operational ASO 2007

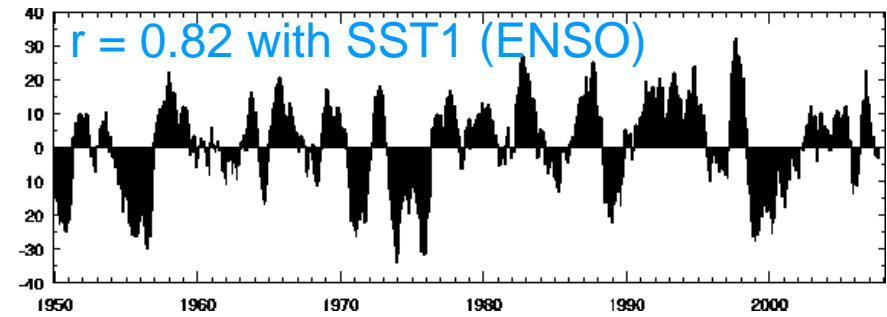
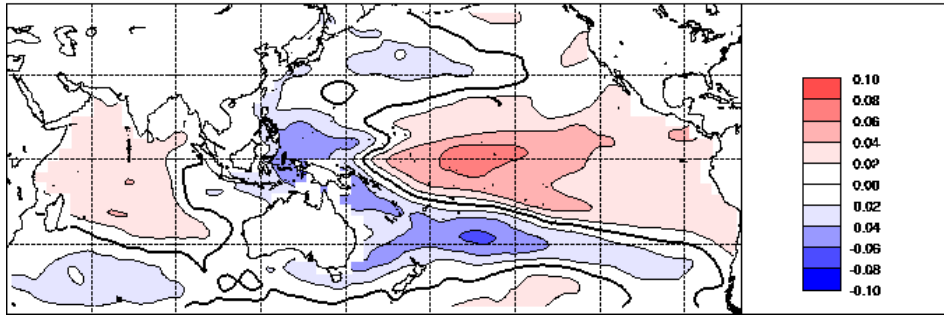
SVD ASO 2006

SVD ASO 2007

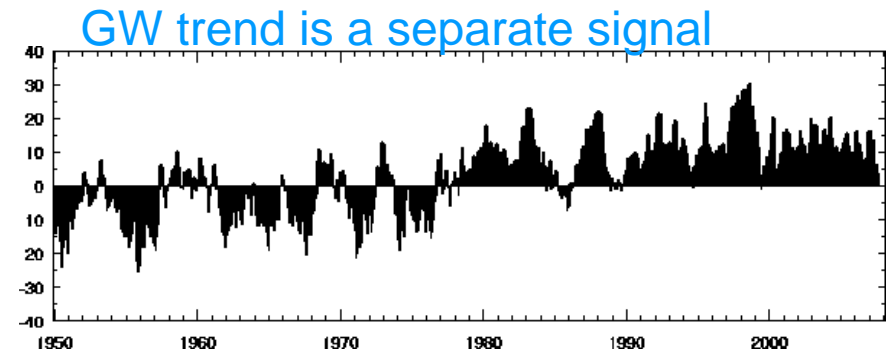
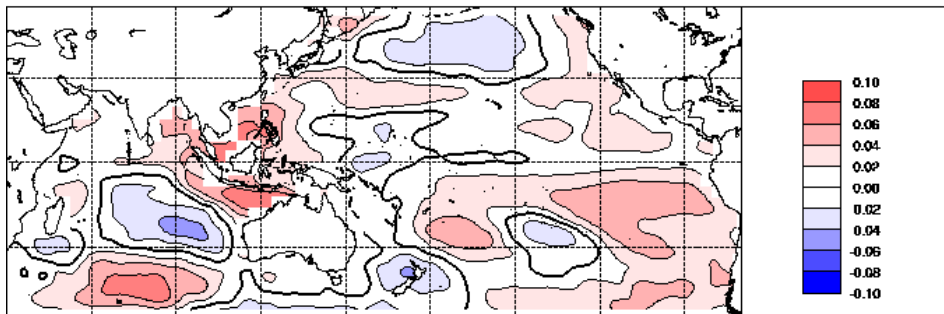


New SCO Predictors – SVD SST - rainfall

SV 1 for SST: 76.5%

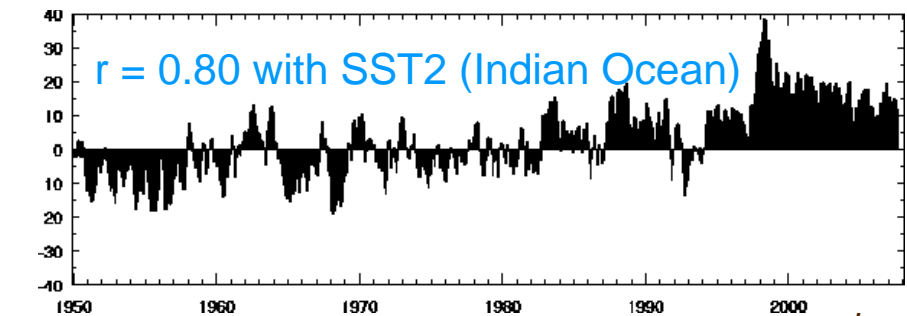
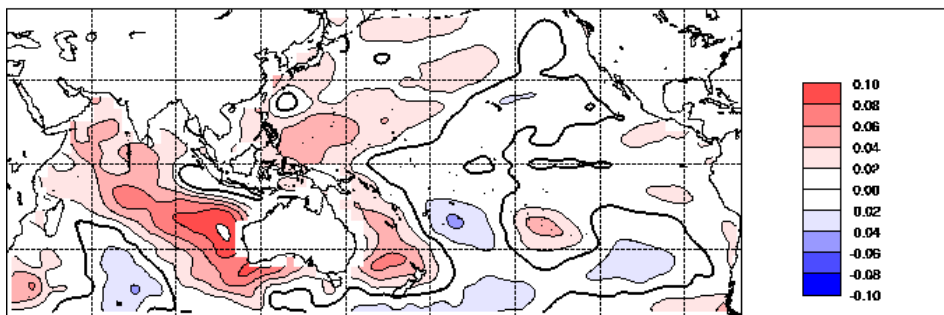


SV 2 for SST: 7.6%



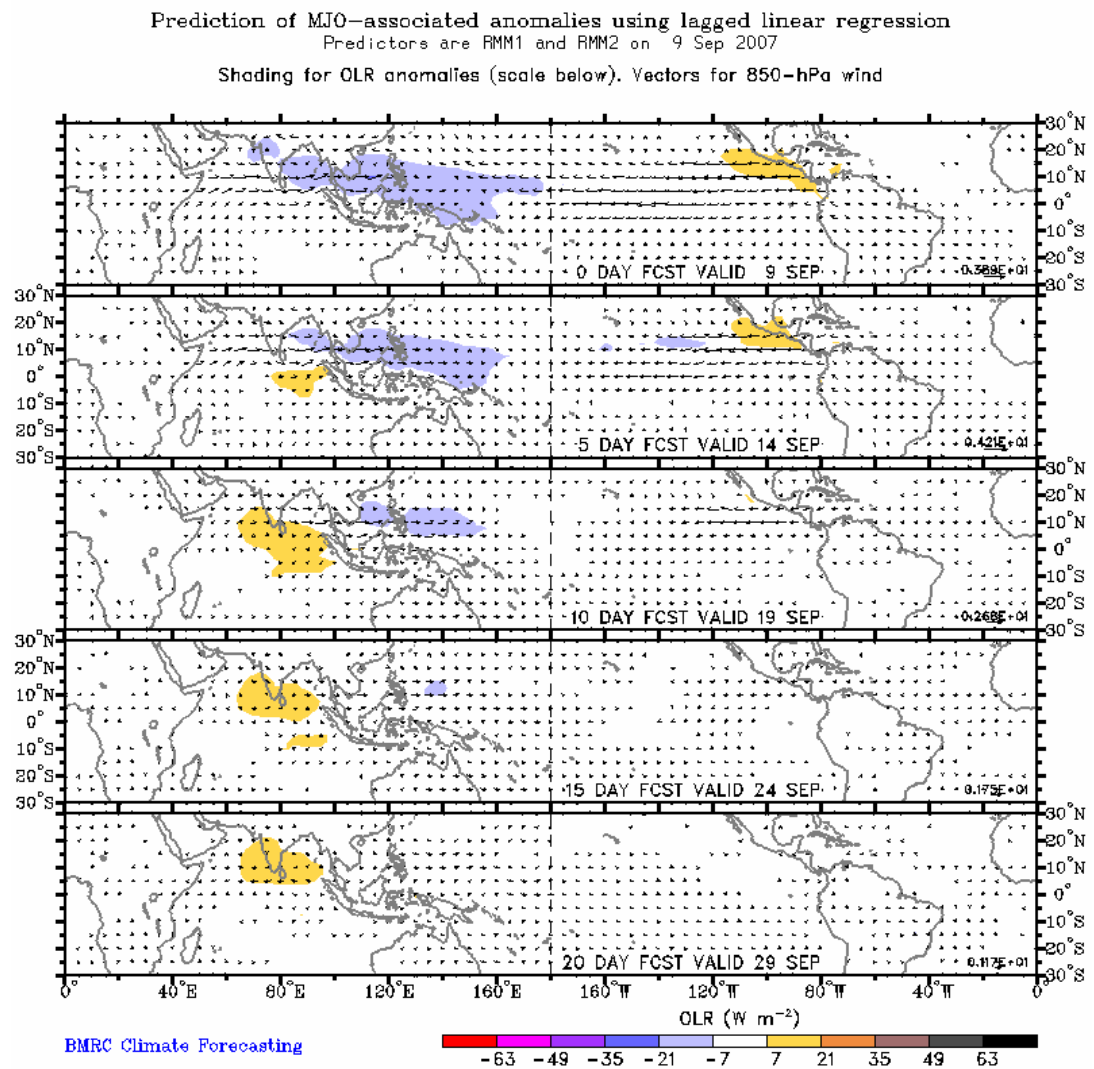
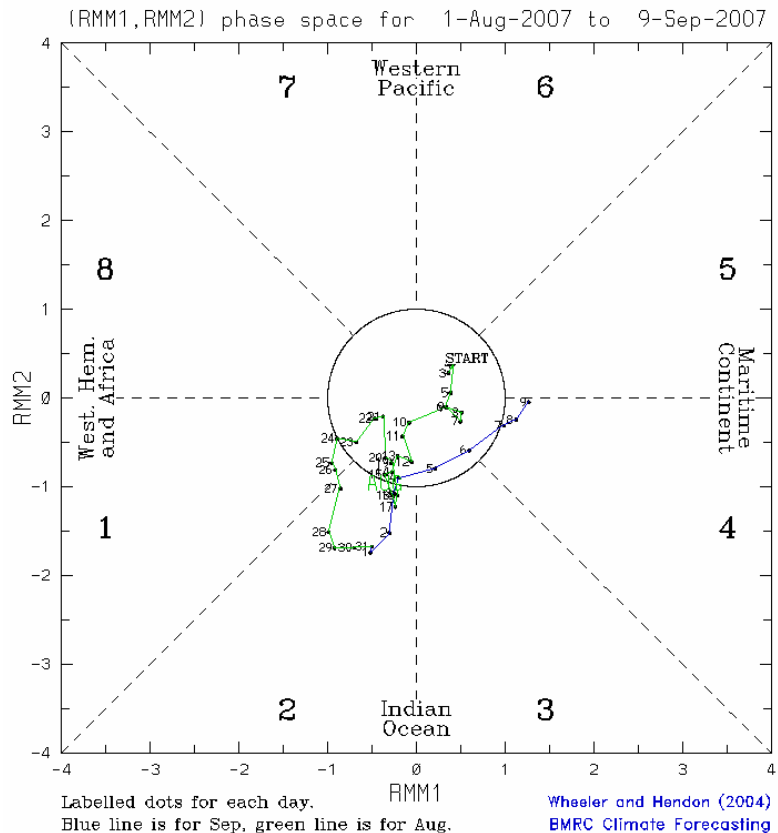
GW trend is a separate signal

SV 3 for SST: 3.9%



Intraseasonal (MJO) prediction

<http://www.bom.gov.au/bmrc/clfor/cfstaff/matw/maproom/RMM/index.htm>



Pacific Islands Climate Prediction Project

<http://www.bom.gov.au/climate/pi-cpp/index.shtml>

Explore Data, analyse relationships, test skill, generate reports

The screenshot displays the SCOPIC software interface, which is used for climate prediction analysis. It features several windows and panels:

- Samoa Outlook - Scatter plots generation:** Shows a project manager with files like SSTAEOFs.txt and Apia_Rainfall.xls. It includes a navigation bar with steps: 1 Organise Data, 2 Explore Data, 3 Analyse Relationships, 4 Test Skill, 5 Generate Report. A regression analysis plot for SSTA1 vs Apia_Rainfall is visible.
- Samoa Outlook - Chocolate-wheel analysis:** Displays a forecast type of 'Terciles' and a pie chart showing probabilities for Jan 2005-Feb 20 Predictands (2mth Totals) using 3mth avg SSTA's 1 and 2 (Jun-Aug). The chart shows: Below Normal (43.2%), Above Normal (28.3%), and Normal (27.5%).
- Report Manager:** Shows a report titled 'Samoa Outlook for January 2005 to June 2005' produced by 'Tester_rtf'. The report is based on June-August SSTA's 1 and 2 (Central Eastern Pacific and Indian Oceans sea-surface temperatures). It includes a section for 'Apia_Rainfall' with a 3D pie chart showing probabilities: Below Normal (42.13%), Above Normal (30.28%), and Normal (27.59%).
- Samoa Outlook - Explore for:** Shows a project manager with predictors (SSTA's 1 and 2, 1 and 9, 1 and 11, SSTA1) and predictands (Apia_Rainfall). It includes a navigation bar and a forecast plot for Apia_Rainfall from 2004 to 2005.
- Samoa Outlook - Analyse Relationships:** Shows a forecast plot for Apia_Rainfall from 2004 to 2005, with a legend indicating observed (O) and predicted (P) values. A forecast accuracy legend shows: Forecast was incorrect (red), Forecast was nearly correct (yellow), and Forecast was correct (green).
- Samoa Outlook - Test Skill:** Shows a forecast plot for Apia_Rainfall from 2004 to 2005, with a legend indicating observed (O) and predicted (P) values. A forecast accuracy legend shows: Forecast was incorrect (red), Forecast was nearly correct (yellow), and Forecast was correct (green).
- Samoa Outlook - Generate Report:** Shows a forecast plot for Apia_Rainfall from 2004 to 2005, with a legend indicating observed (O) and predicted (P) values. A forecast accuracy legend shows: Forecast was incorrect (red), Forecast was nearly correct (yellow), and Forecast was correct (green).



Coupled Model Prediction

Predictive Ocean Atmosphere Model for Australia

poama.bom.gov.au

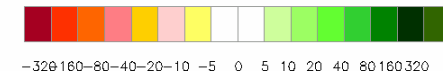
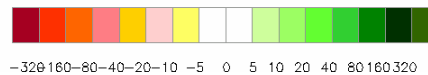
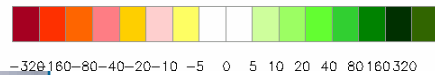
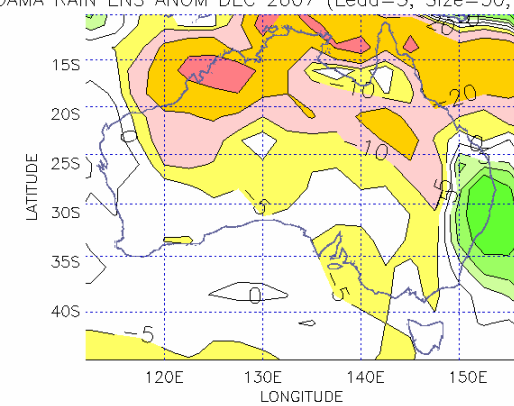
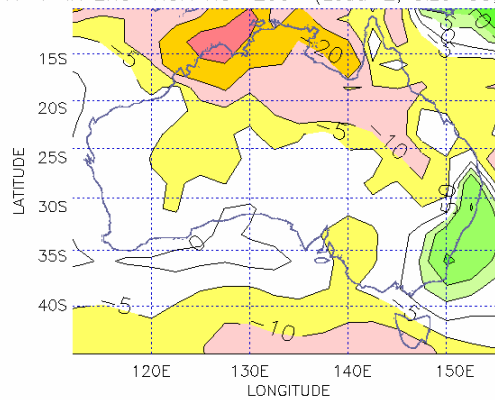
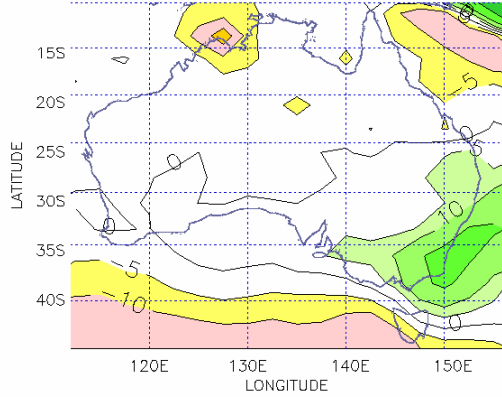
<http://opendap.bom.gov.au:8080/thredds/bmrc-poama-catalog.html>

- Australian Bureau of Met. is one of nine WMO Global Producing Centres for Long Range Forecasts.
- Daily 9-months forecasts produced. Currently switching to POAMA version 1.5 and expanding operational role.
- Operational products issued by the BoM National Climate Centre: Nino SST forecast. (POAMA SST, temp and precipitation forecasts issued for 1.5).
- Forms part of APCC model suite.

Rainfall & Temperatures

<http://poama.bom.gov.au/experimental/index.htm>

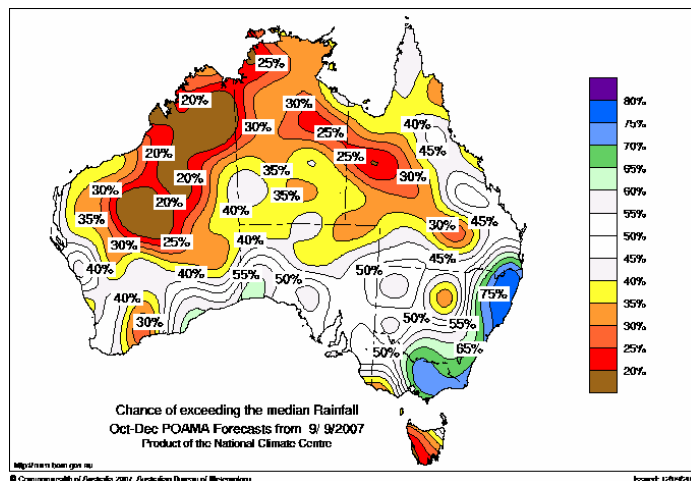
POAMA RAIN ENS ANOM OCT 2007 (Lead=1, Size=30, mm/month) POAMA RAIN ENS ANOM NOV 2007 (Lead=2, Size=30, mm/month) POAMA RAIN ENS ANOM DEC 2007 (Lead=3, Size=30, mm/month)



October

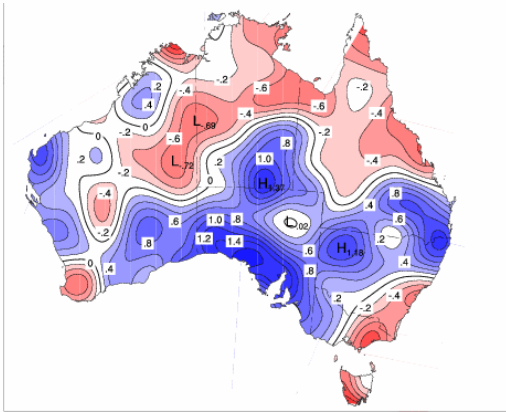
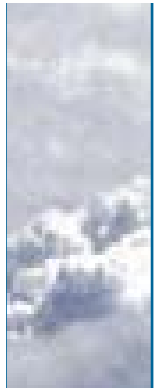
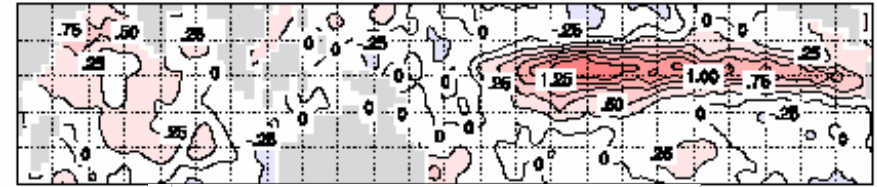
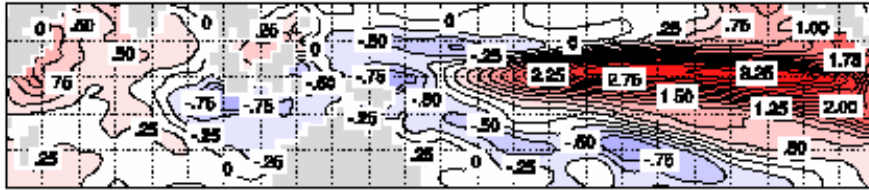
November

December

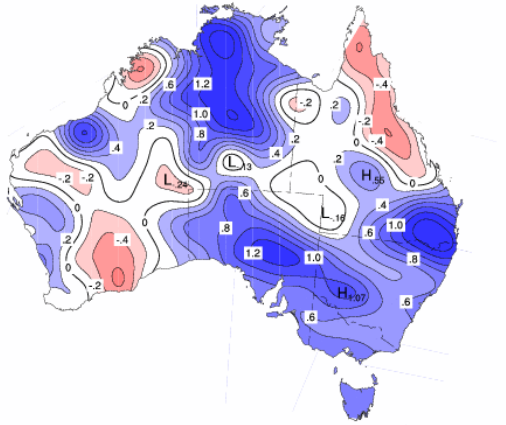
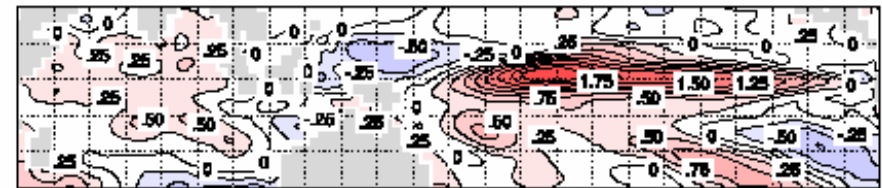
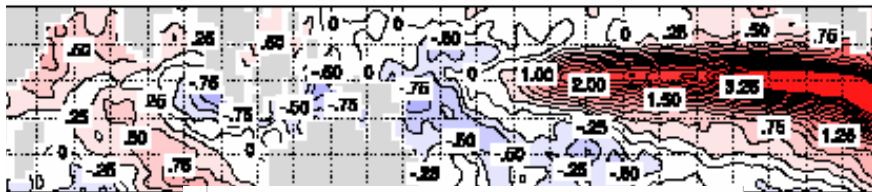
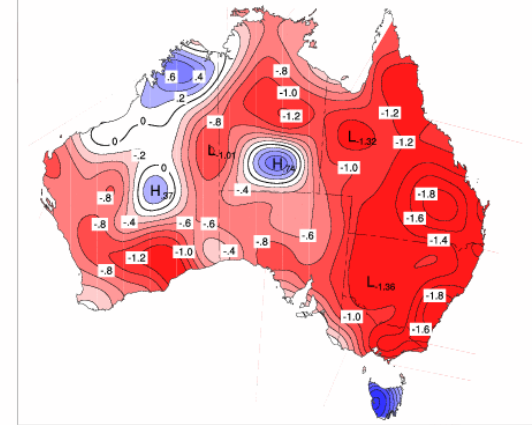


Direct model output
seasonal probability of
above median rainfall

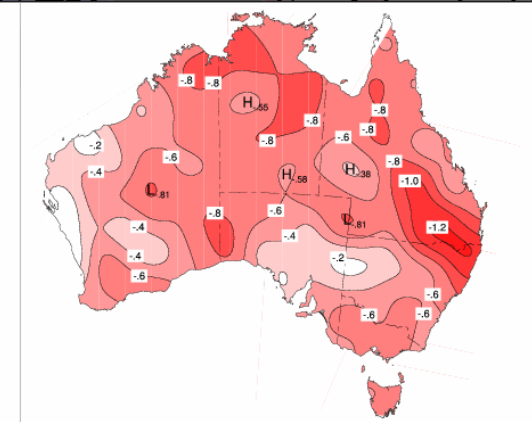
POAMA prediction of SST and Australian Rainfall 1997(SON) vs 2002(SON)



OBS



POAMA at Lead 0

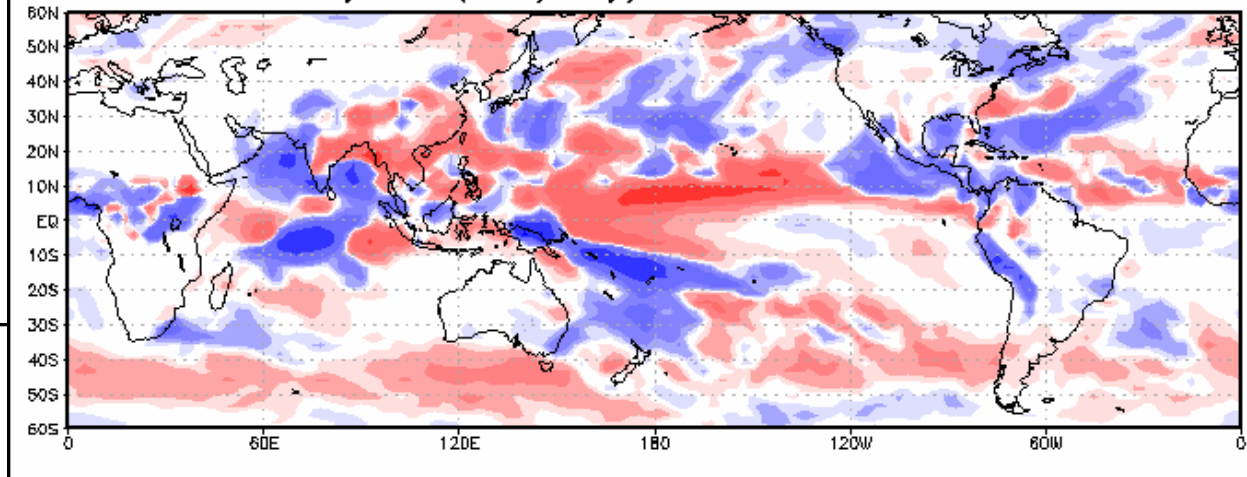


Intraseasonal Forecasts

http://poama.bom.gov.au/experimental/poama15/ri_map.htm

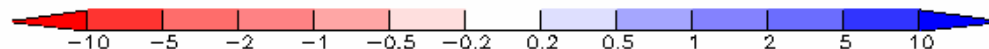
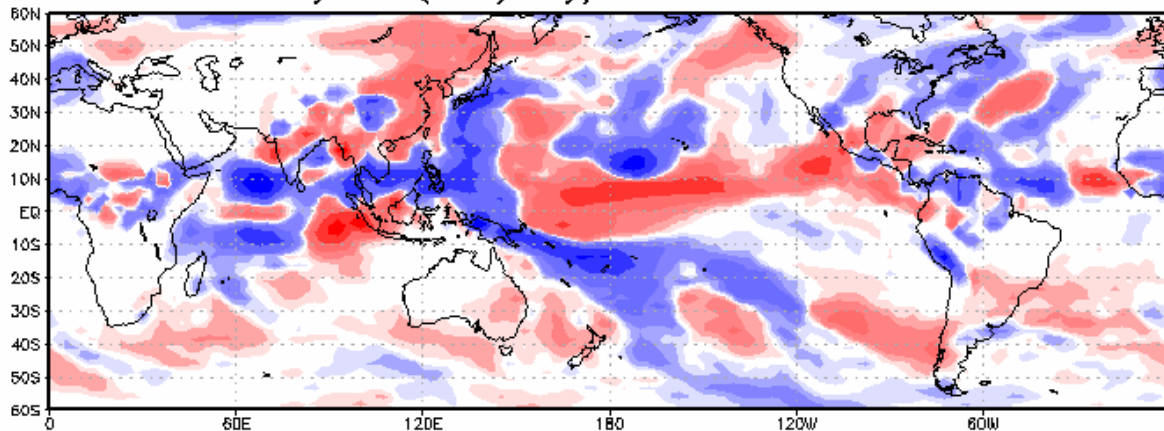
Days 16-30

Rainfall anomaly FC (mm/day): Mean of 20070926–20071010



Days 1-15

Rainfall anomaly FC (mm/day): Mean of 20070911–20070925



Intraseasonal
forecast of MJO,
rainfall & convection

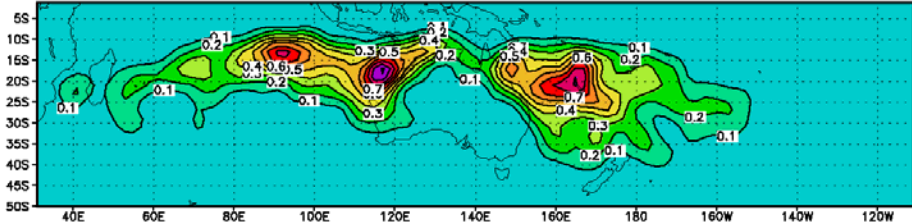
Prediction of Extremes

current, near future and research

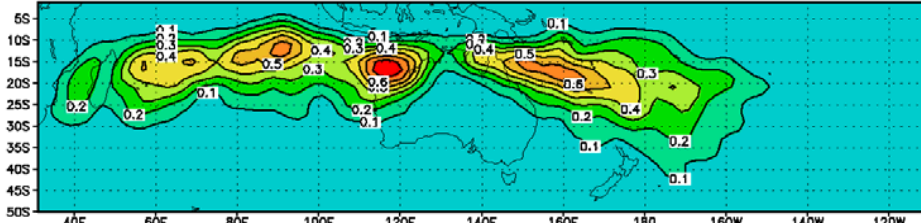
Fire Potential Outlook

Tropical cyclones in La Nina (top), neutral and El Nino (bottom) years

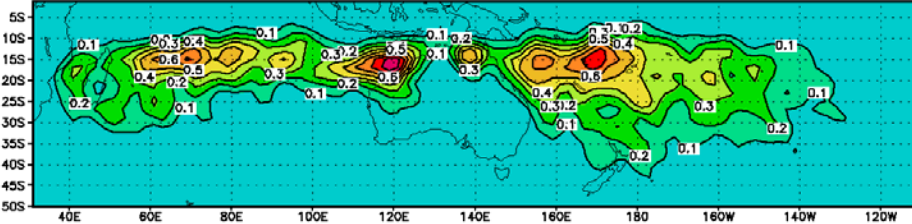
Average TCs in La Nina years



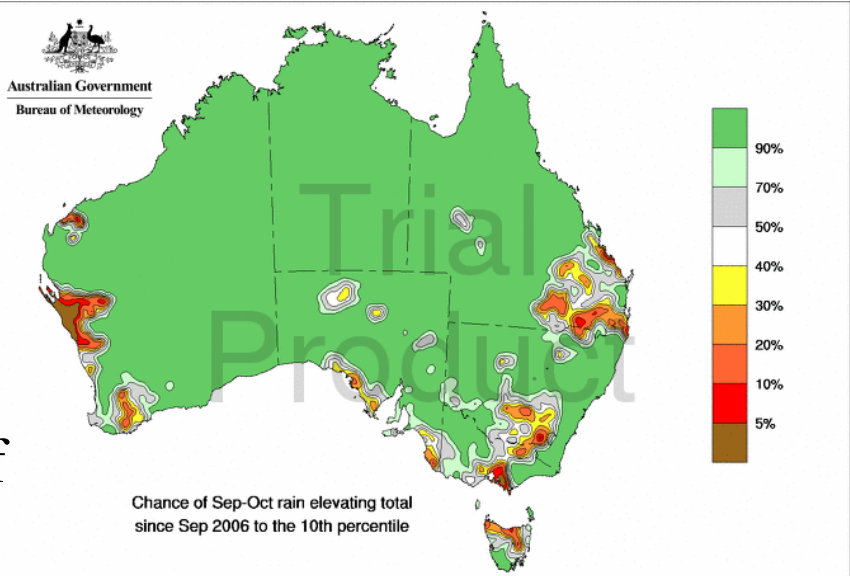
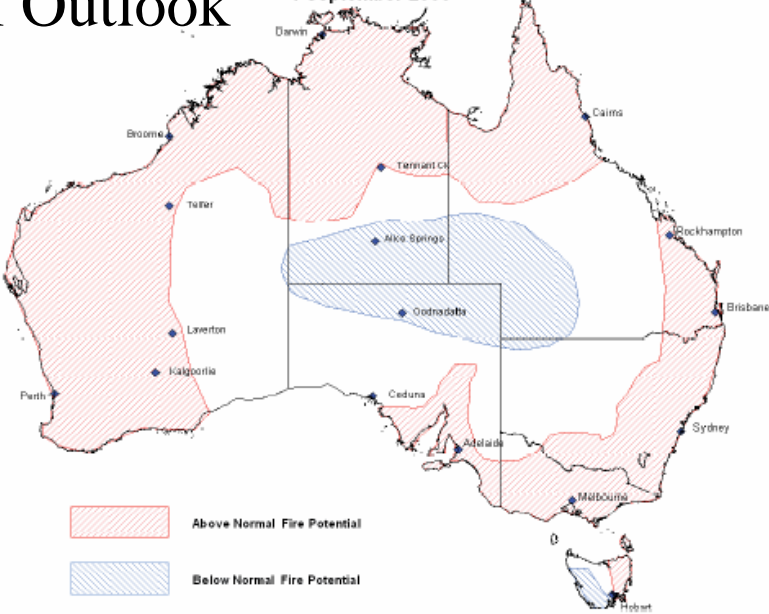
Average TCs in Neutral years



Average TCs in El Nino years

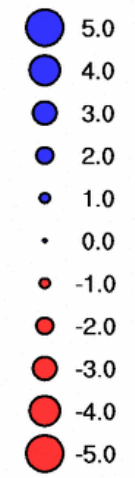
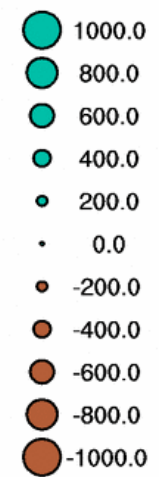
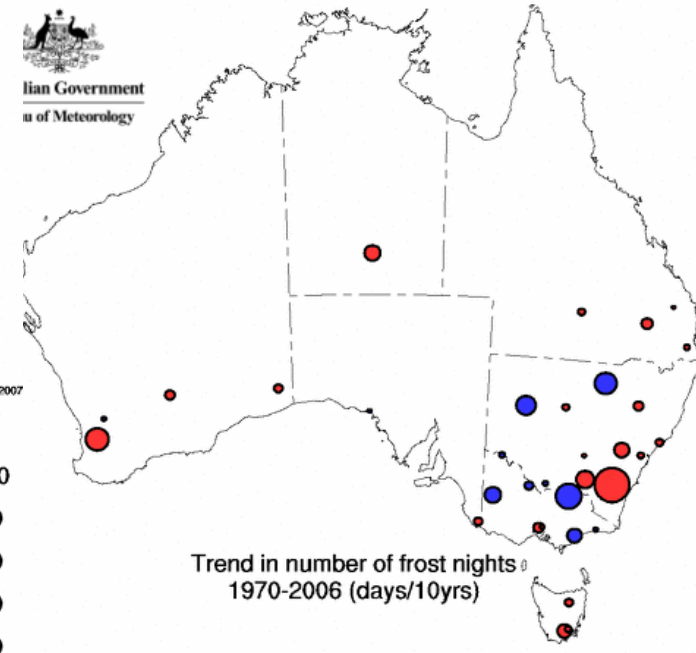
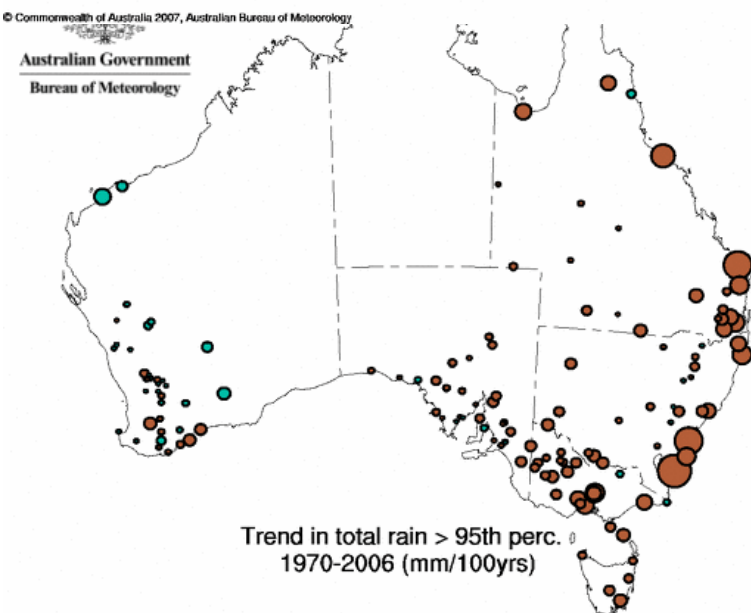
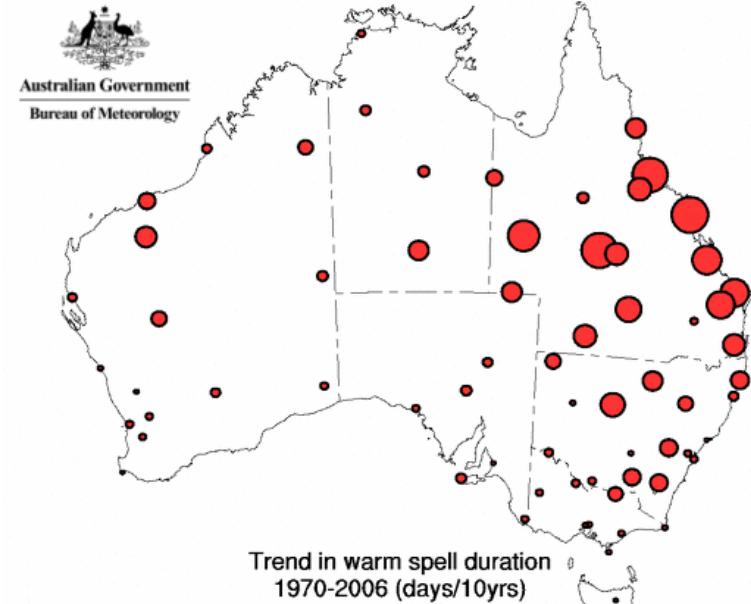


Seasonal Fire Potential Outlook
4 September 2006



Drought Relief

Prediction of Extremes – Possibilities?





Summary

- Current seasonal forecasts of rainfall and temperature use statistical relationships with SST anomalies in the Pacific and Indian Oceans.
- Skill of current forecasts affected by warming trend in oceans updating with SVD statistical scheme.
- over the next year explore skill and implement POAMA1.5 forecasts for rainfall and temperature over Australia.
- Possibility to expand prediction of extremes in the coming years.



Thank You