Development of the POAMA-2 dynamical seasonal prediction system at the Bureau of Meteorology

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Australia

Plan

- Brief overview of POAMA-1
- Intra-seasonal predictions (from POAMA-1)
- POAMA-2 and beyond

POAMA

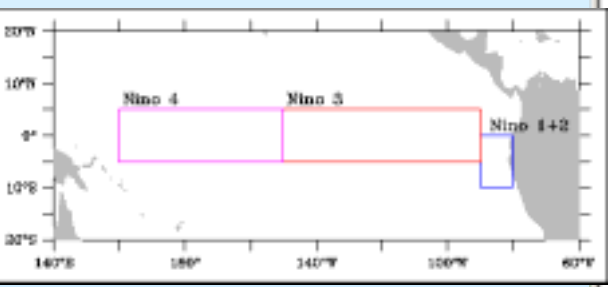
Predictive **O**cean **A**tmosphere **M**odel for **A**ustralia

- **Global coupled model GCM seasonal forecasting system**
- **Joint project between BMRC and CSIRO Marine Research**
- **POAMA-1 run in real-time by BoM operational section since 1st October 2002**
- **Operational products issued by the BoM National Climate Centre (NCC)**
- **Starting contributing POAMA-1 products to APCN**
- **Experimental products available on the POAMA web site**

www.bom.gov.au/bmrc/ocean/JAFOOS/POAMA

Experimental results pages

Will also include ocean analyses



POAMA predictive ocean atmosphere model for australia

Introduction | Bureau of Meteorology Operational Products | Experimental Products | Public Education/ Outreach | Scientific Outreach | On-going Research | FAQs | Links | Site Index

Experimental forecasts from operational version

Under construction - some plots are not yet available!

Real-time forecasts (from Oct'2002) | Hind-casts (1987-2001)

Real-time Forecasts

Select plot type

Nino Curves

Select ensemble averaging

Mean last 30 forecasts

Select area

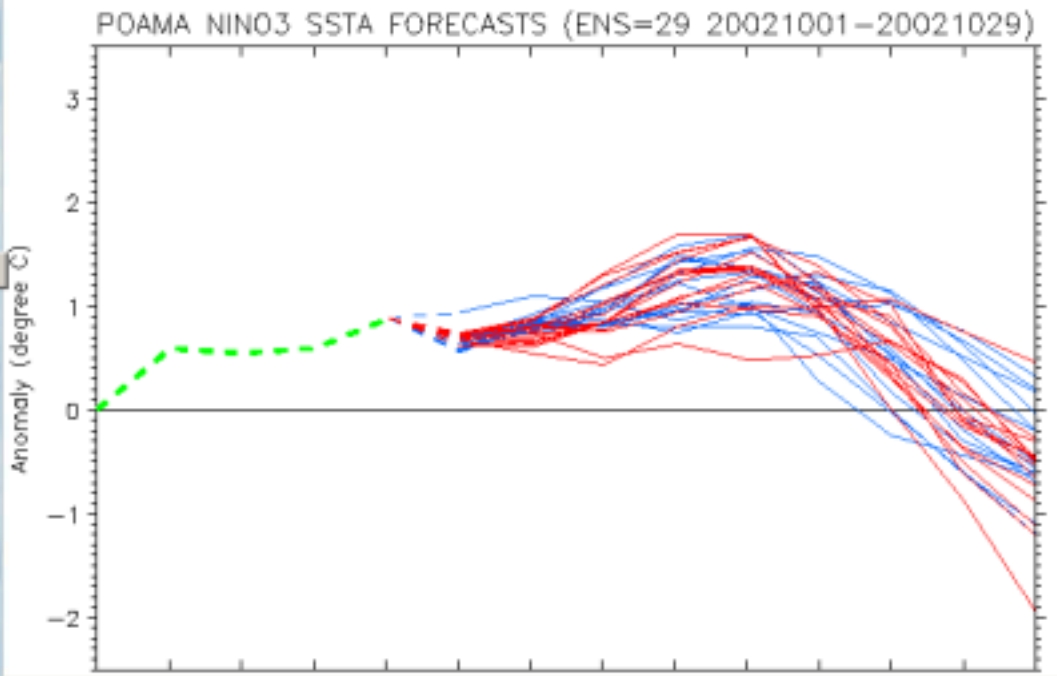
Nino 3

Click to generate plot

Plot below shows latest 30 forecasts of NINO 3 SST anomaly

For other plots use the bar on the left hand side

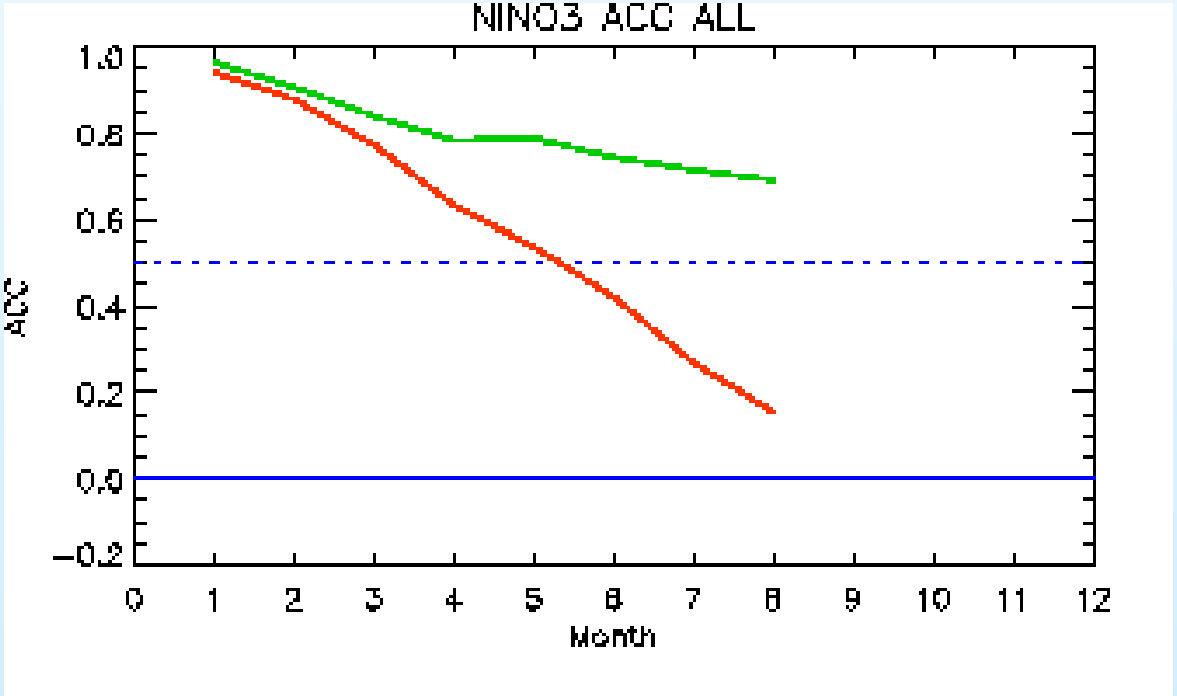
(red - last 15 forecasts, blue - previous 15 forecasts)



Skill of SST Predictions

Hind-casts: one forecast per month, 1987-2001 (180 cases)

Anomaly correlation

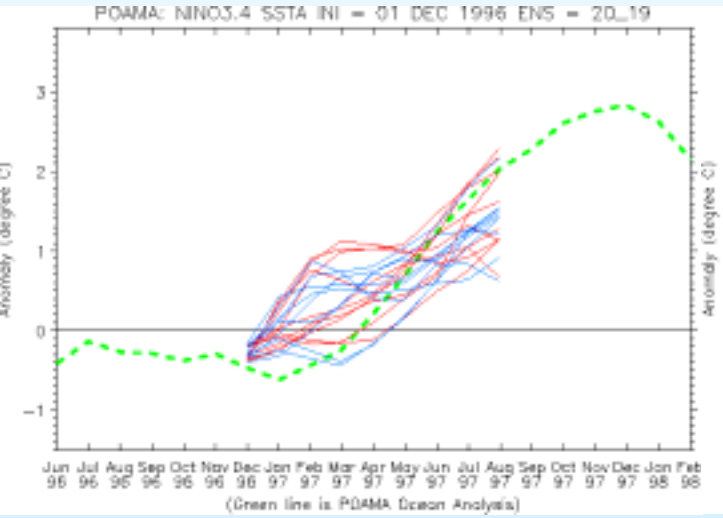


Green - model, red - anomaly persistence

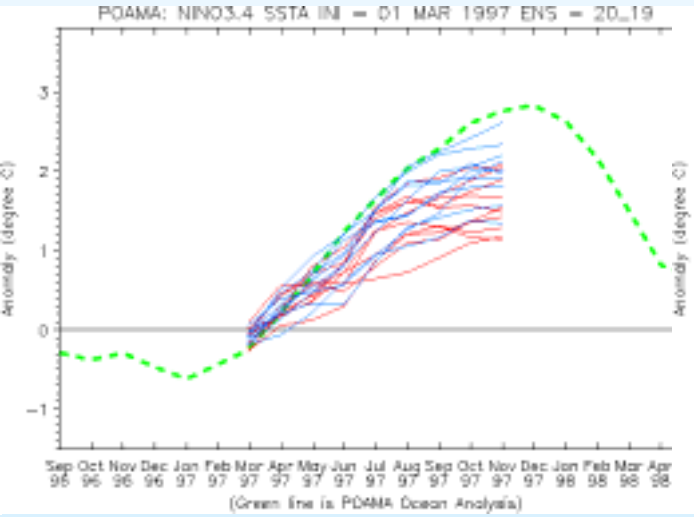
Nino 3.4 of 97/98 El Nino

Forecasts starting

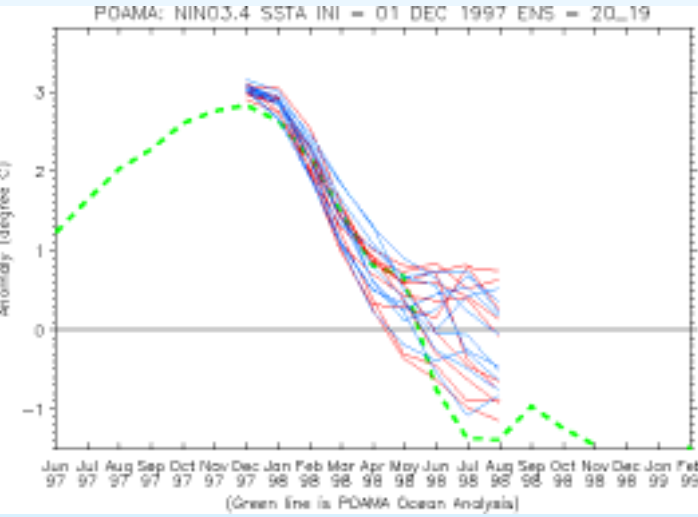
1 Dec 96



1 Mar 97



1 Dec 97



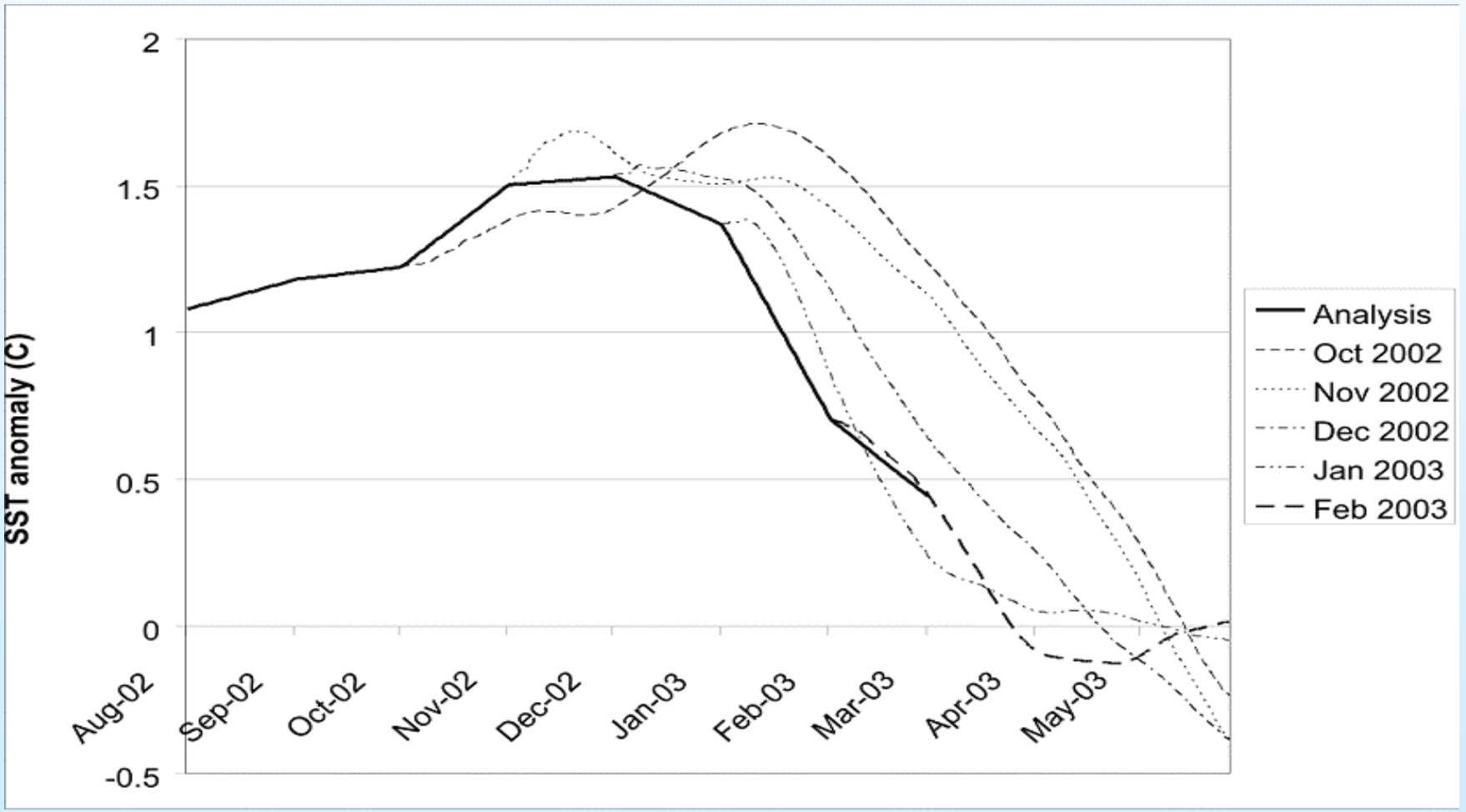
Current variability research:

- **Mechanism for decay of ENSO (Wang, Hendon, Alves)**
- **Role of MJO during onset of 1997/8 Event (Shi, Alves, Hendon)**

Decay of 2002 El Nino

POAMA-1 Real-time forecasts

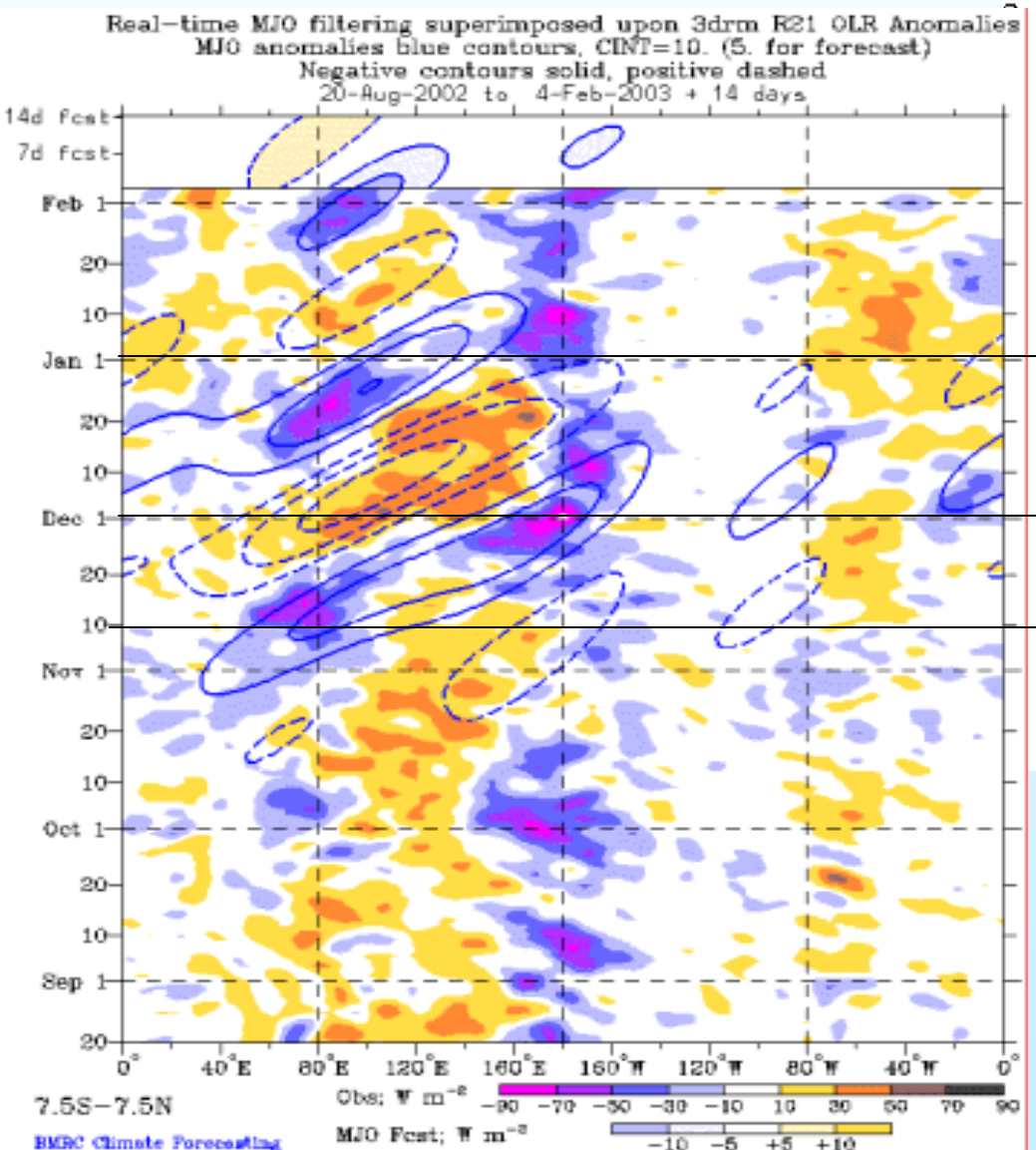
Each forecast is 30 member monthly ensemble mean

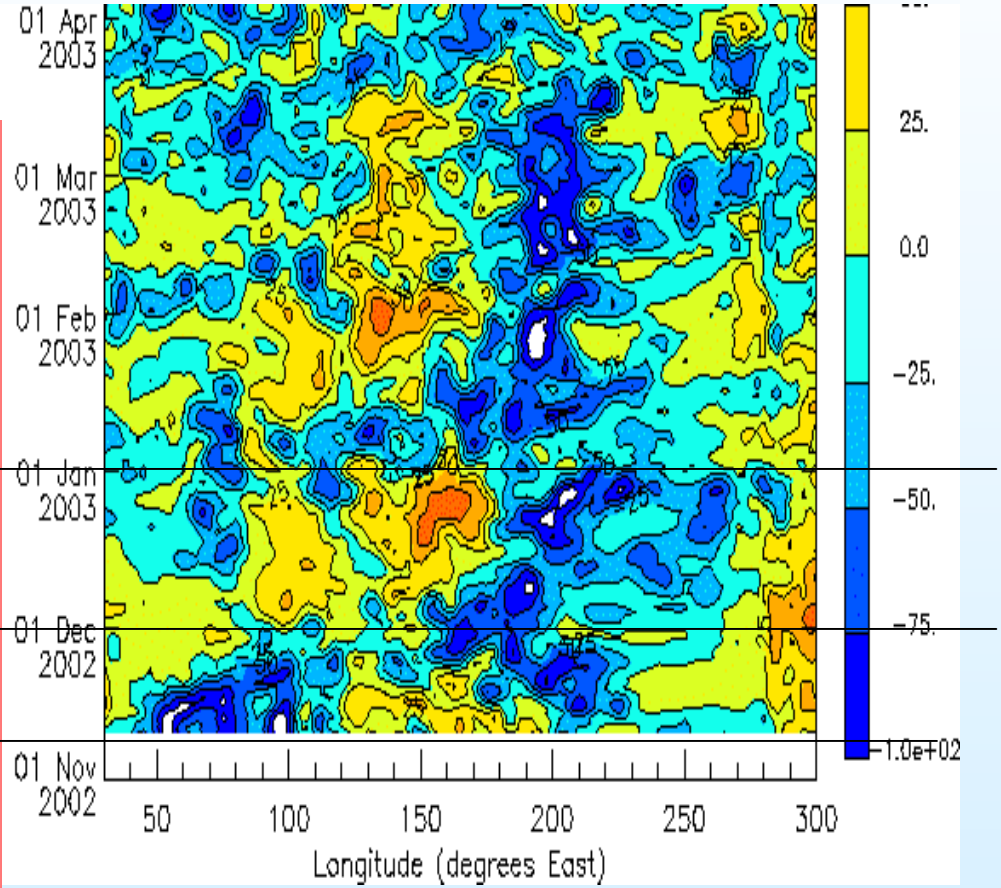


Intra-seasonal predictions

- **POAMA-1 System initialised in real time with latest ocean/atmos observations (within 1 day of real time)**
- **Able to simulate the MJO**
- **One forecast per day**
- **Doubles up as intra-seasonal prediction system**
- **Can we create ensemble MJO forecast products ?**

Observed - Matthew Wheeler

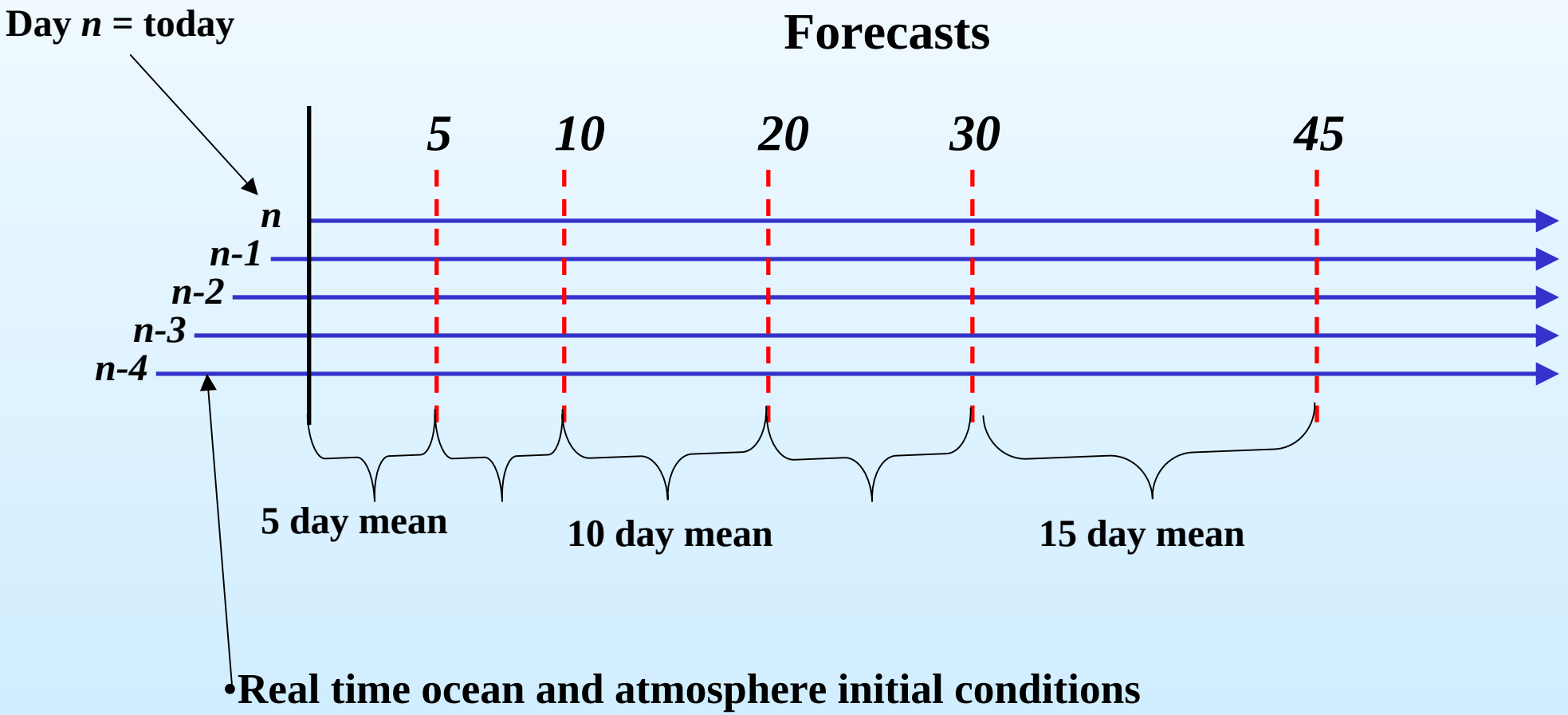




Coupled forecast starting 10th November

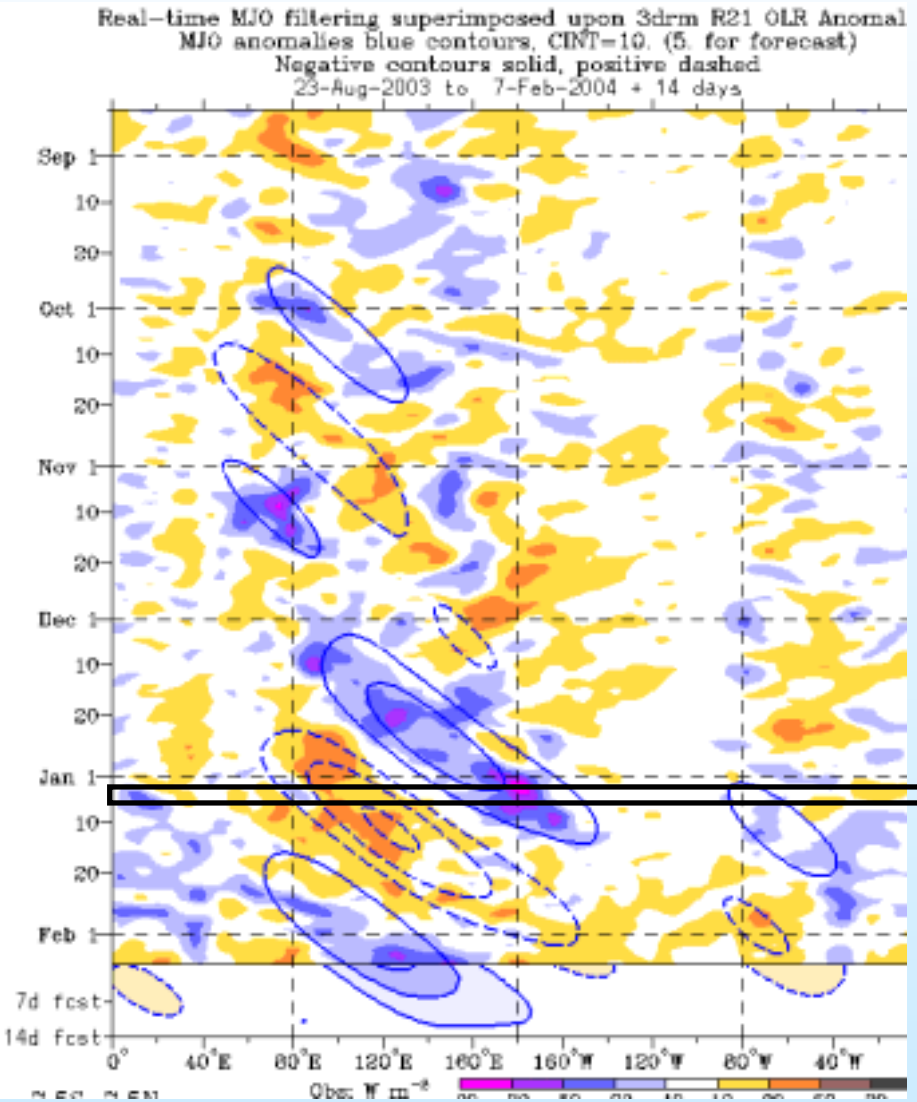
Intra-seasonal predictions

•Products based on ensemble mean of last 5 forecast

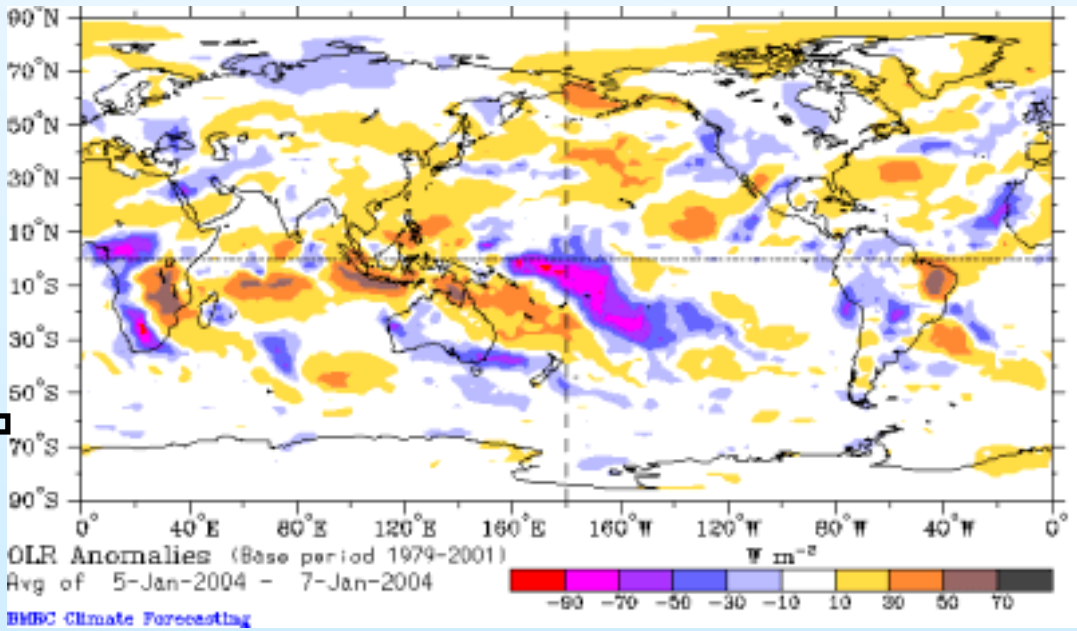


•Real time ocean and atmosphere initial conditions

Example: Dec/Jan 2003/4

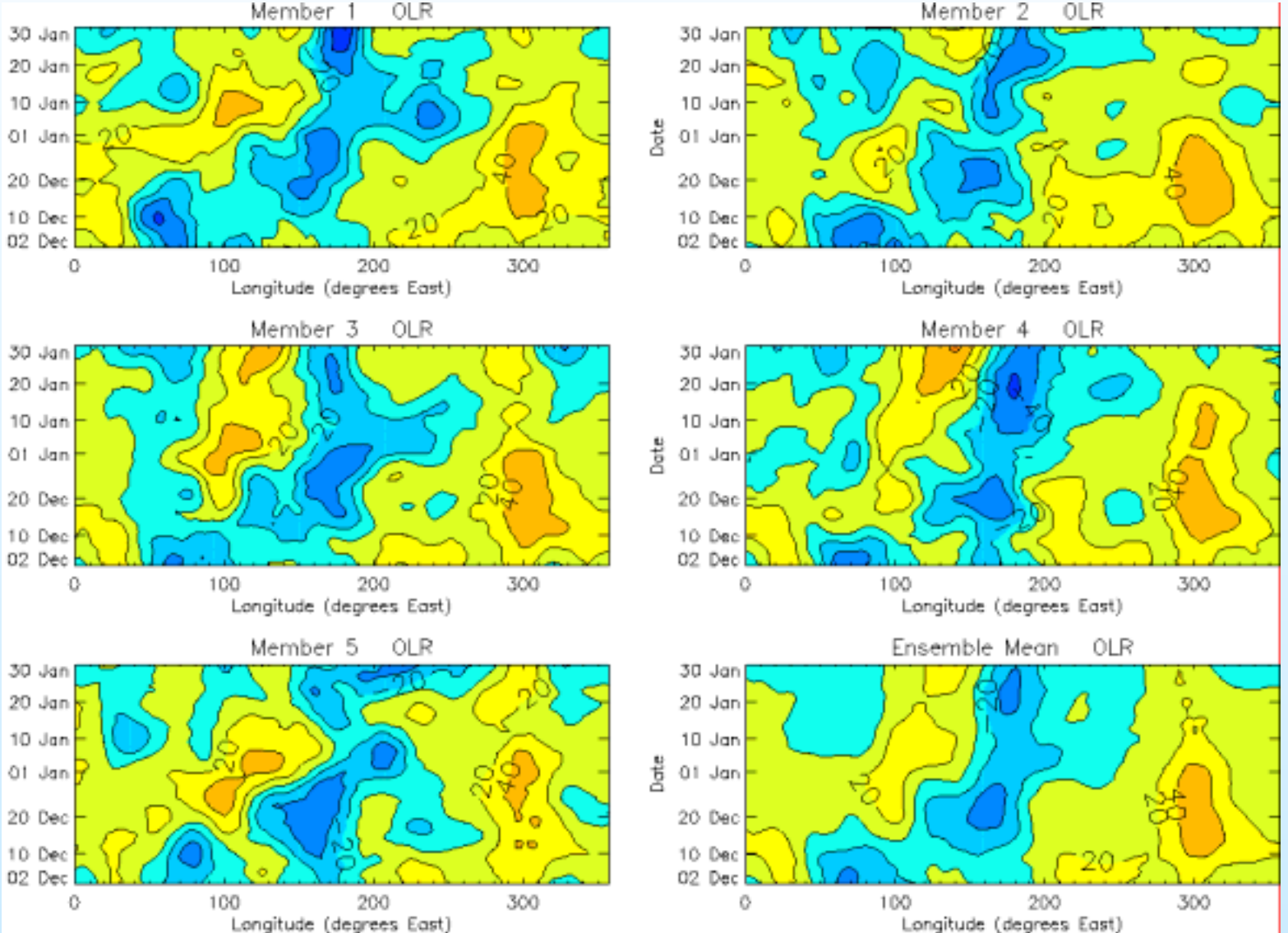


5-7 Jan



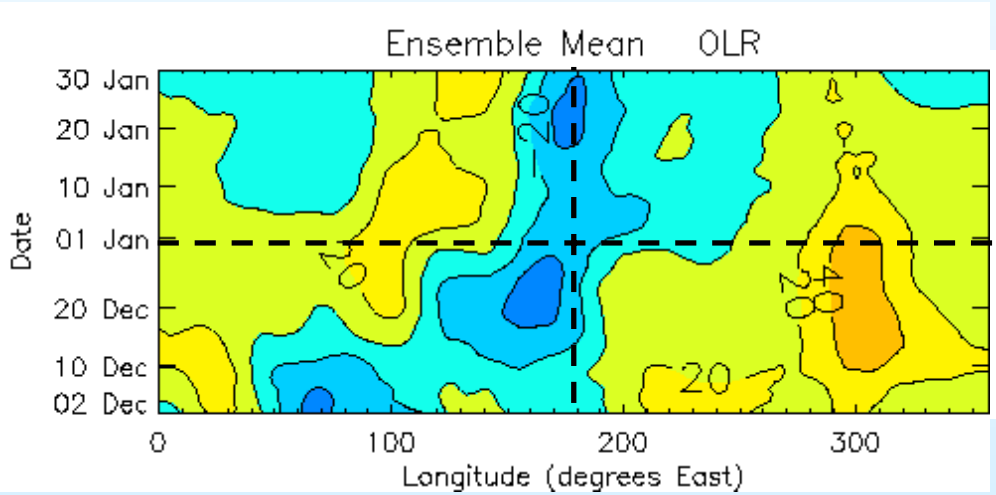
Example: Dec/Jan 2003/4

Forecasts starting 1st Dec (& previous 4 days)

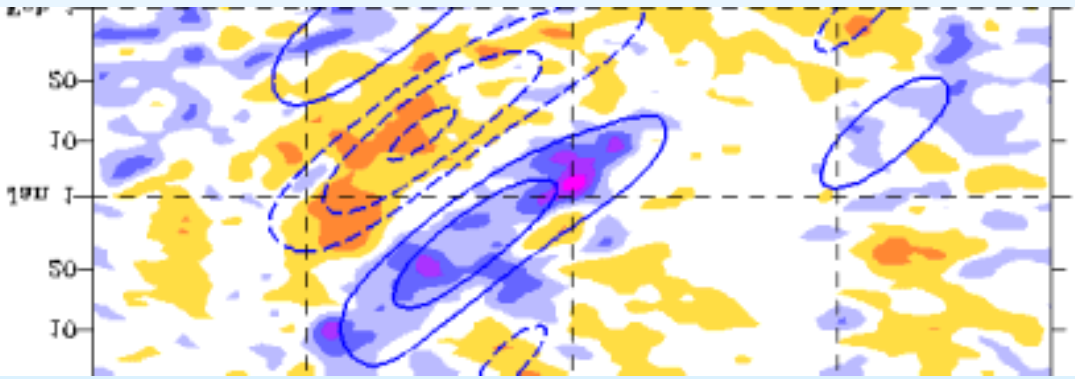


Example: Dec/Jan 2003/4

Ensemble mean



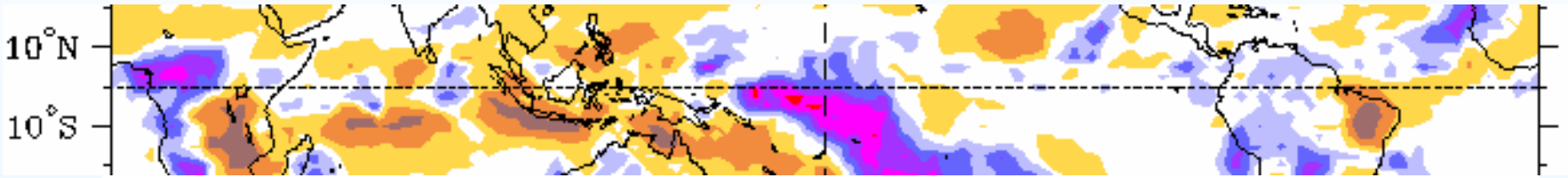
Observations



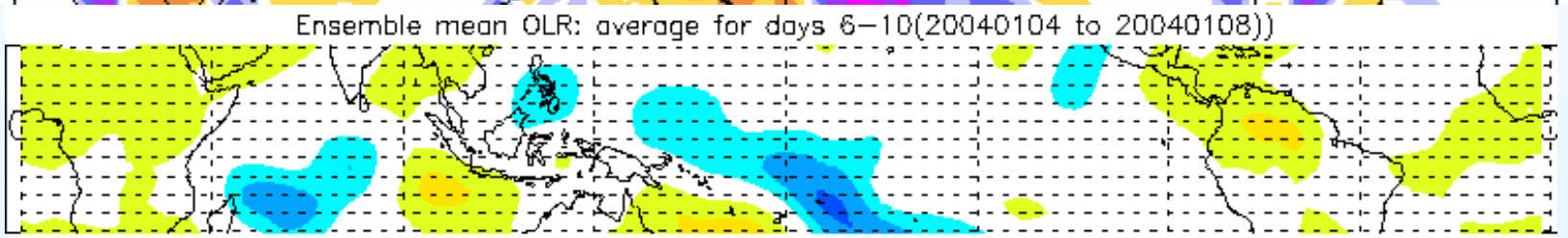
Intra-seasonal case - OLR forecasts

Obs

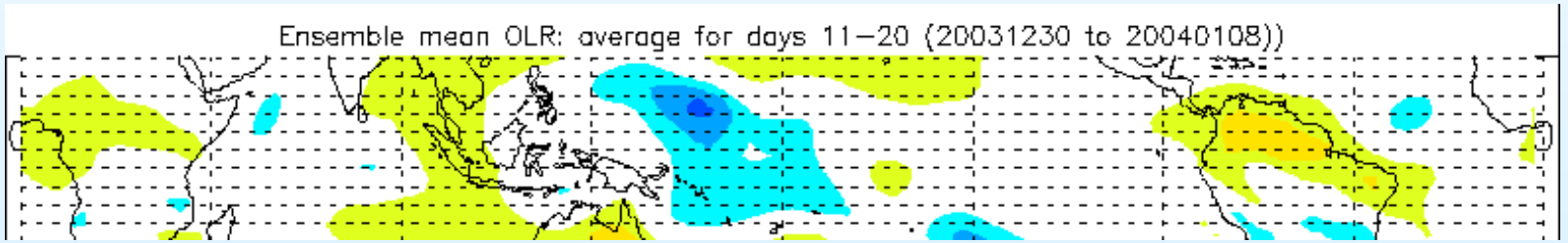
5-7 Jan



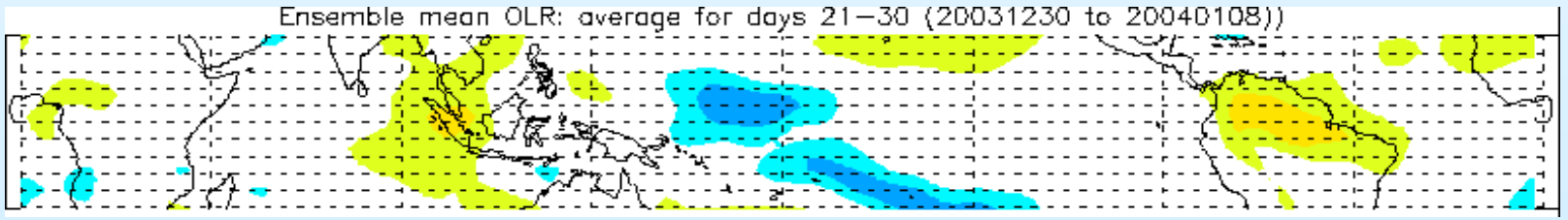
6-10 days



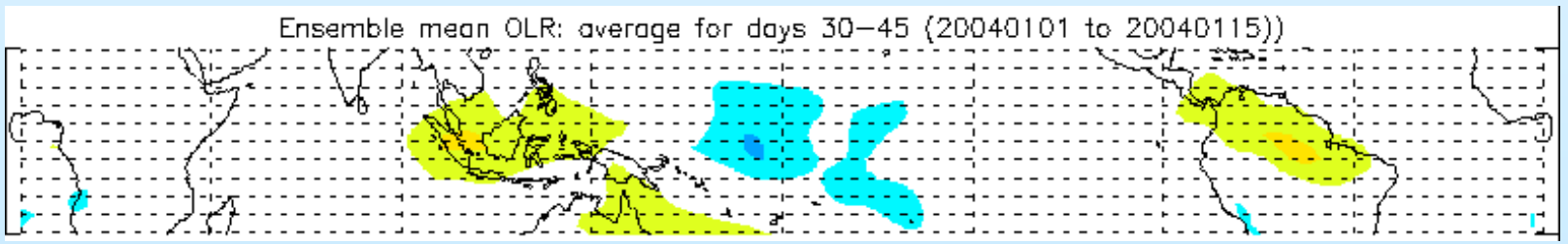
11-20 days



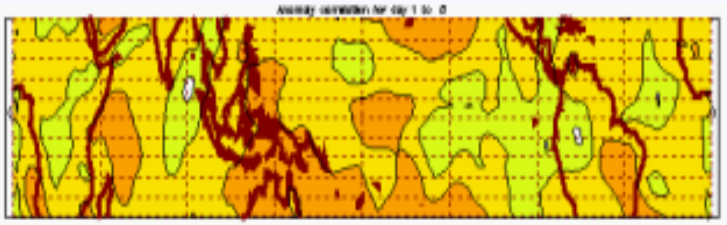
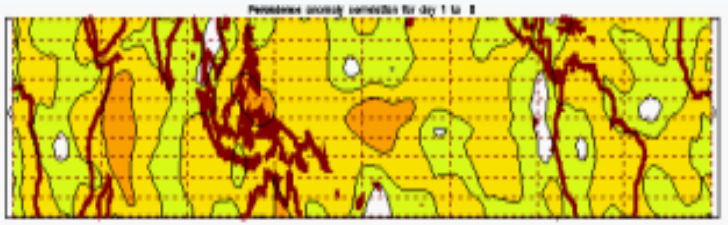
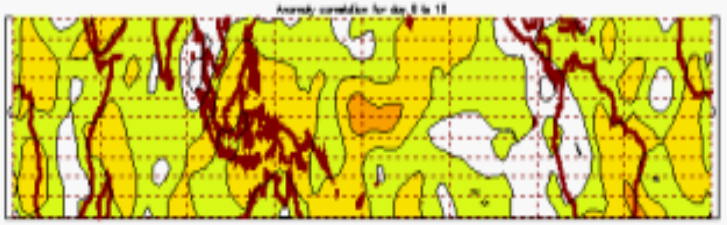
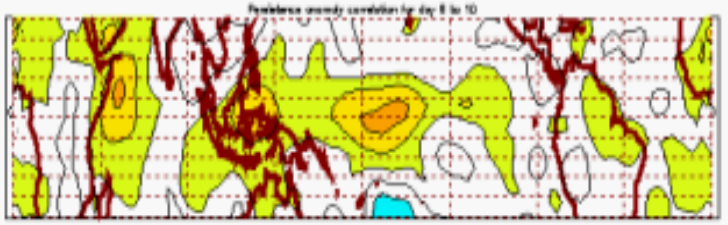
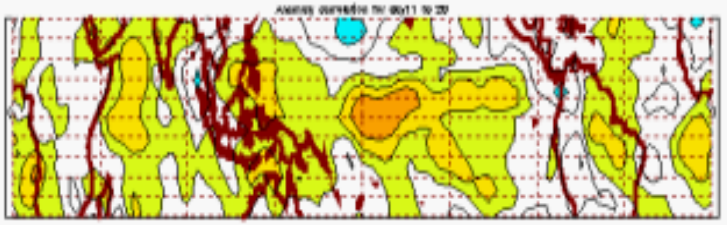
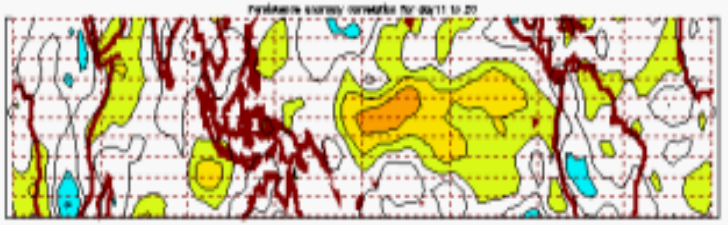
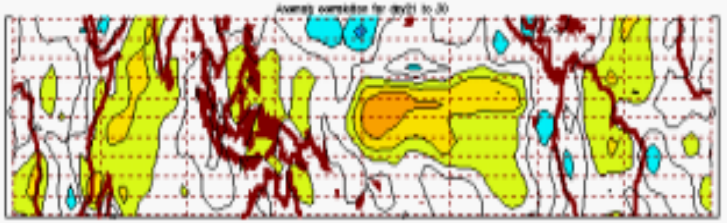
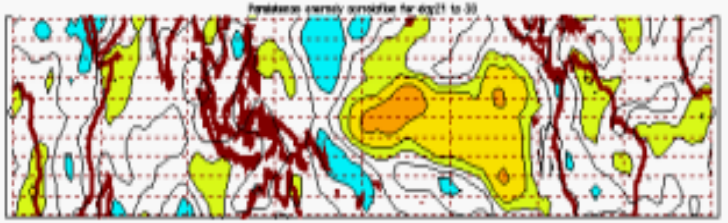
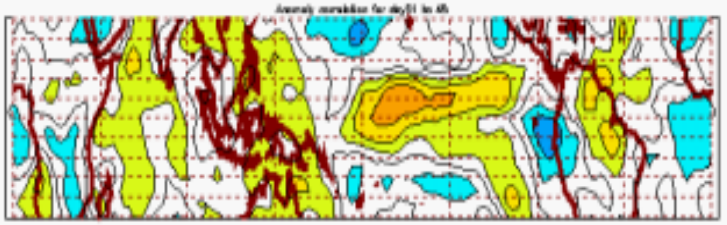
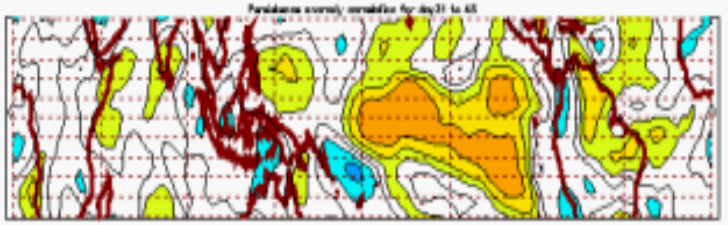
21-30 days



30-45 days



Intra-seasonal skill based on real-time forecasts (since Oct 2002)

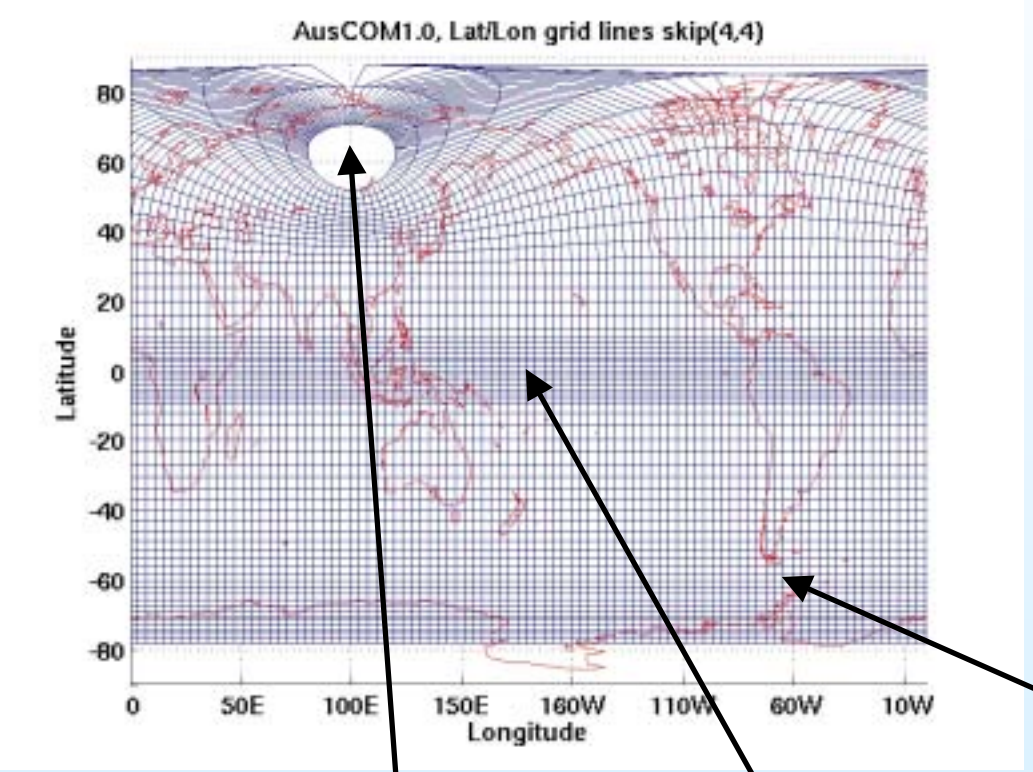
Lead time	Model	Persistence
1-5 days		
5-10 days		
10-20 days		
20-30 days		
30-45 days		

POAMA-2 and longer term future

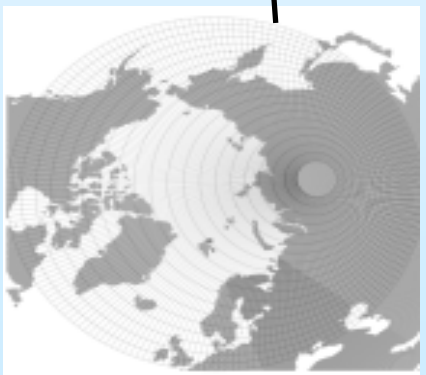
- **POAMA-2 Presently being assembled**
- **Operational impementation in mid 2005**
- **Ensemble hind-casts 2005-6**

Past: POAMA-1 2002-2005	Present: POAMA-2 2004-2006	Future: POAMA-3+ 2005+
BAM3 T47L17	BAM4 T63L50 New Physics: ECMWF Boundary Layer UKMO Radiation Cloud microphysics Lott and Miller GWD	?National model? Seasonal to clim. change T95L50 ?? Reduced drift, better tropical convection and rainfall variability
Land surface Bucket scheme	ECMWF land surf 4 layers	?National model?
Ocean Model: ACOM2 (based on MOM2) 1.8°x0.5° equatorial strip	ACOM2	AusCOM-1

AusCOM - Australian Climate Ocean Model



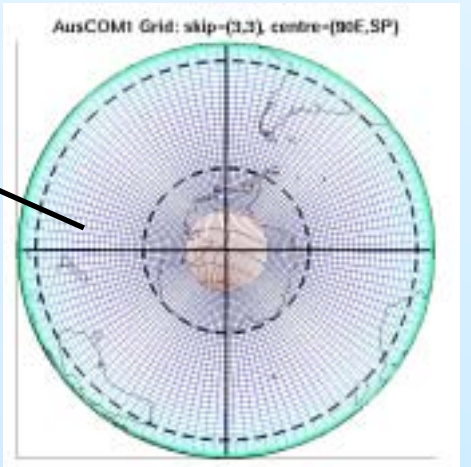
- Developed by Aus Community
- BMRC, CSIRO, Antarctic Centre, Universities
- Seasonal to Climate Change
- 1 degree background resolution
- 45 levels, enhanced surface layer and thermocline resolution
- Based on GFDL MOM4
- Ice model



Shifted North Pole

Enhanced tropical grid

1°x1/3°



~30kmx30km res. in Southern Ocean

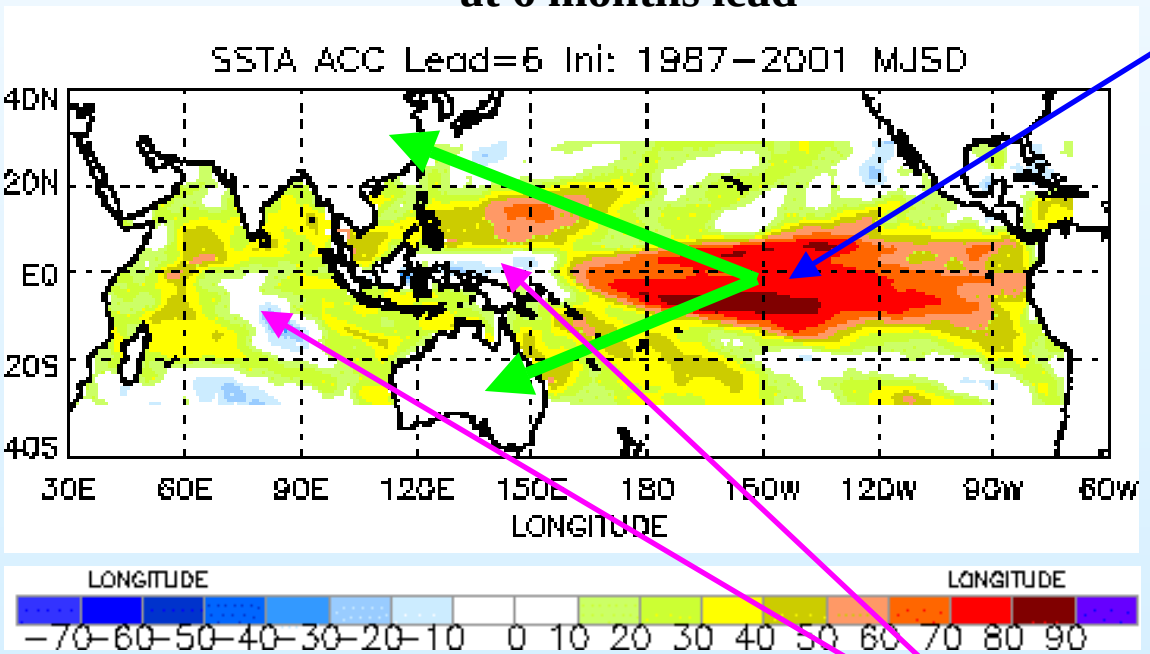
Past: POAMA-1 2002-2005	Present: POAMA-2 2004-2006	Future: POAMA-3+ 2005+
Atmos Initialisation: **NWP real-time** **AMIP hind-casts**	**NWP real-time** **ERA40 hind-casts**	**?**
Land surface I. C. **Climatology**	**NWP real time** **ERA40 hindcasts**	**?**
Ocean Initialisation: **Optimum interpolation (OI)** **All sub-surface data**	**OI** **Re-tune statistics** **Add SST obs**	**Ensemble Kalman Filter** **Time dependent co-variances** **All obs: temperature,** **Sea level, Salinity** **Correct all variables**

Past: POAMA-1 2002-2005	**Present: POAMA-2** 2004-2006	**Future: POAMA-3+** 2005+
Hindcasts **One per month** **1987-2001**	**Hindcasts** **10 per month** **1980-2005**	**At least 10 per month** **Last 25 years**
Ensemble generation: **One per day**	**Ensemble generation:** **One per day**	**Use** **Ensemble Kalman Filter**
Focus: **El Nino SST**	**Focus:** **El Nino SST** **Trial rainfall** **Trial Intra-seasonal**	**Focus:** **Start to look beyond** **Pacific SST** **driven predictability**

The END - Summary

Anomaly Correlation for SST

at 6 months lead



POAMA-1

Skillful ENSO forecasts

POAMA-2

Link to rainfall

POAMA-3

Predictability from outside eq. Pacific

+ Intra-seasonal