The New POAMA-2 Seasonal and Multi-Week Prediction Systems

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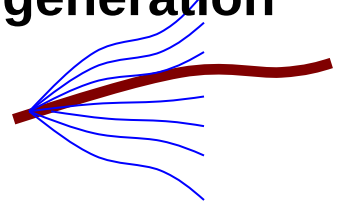
Bureau of Meteorology

Outline

- Summary of the new POAMA-2 system
- Seasonal skill
- Monthly/Multi-week Skill

POAMA-1.5/POAMA-2 Differences

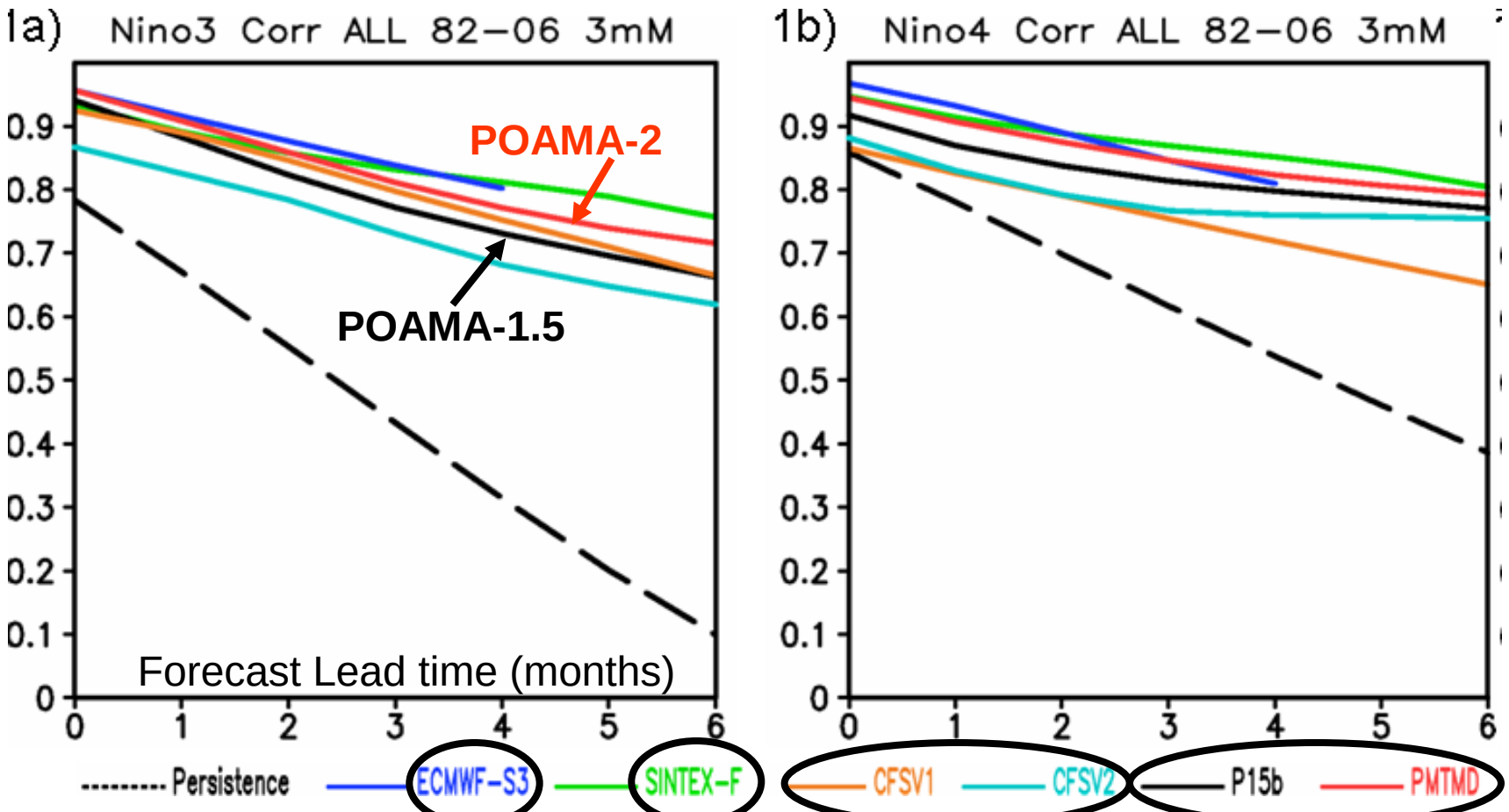
	POAMA-1.5	POAMA-2
Model	T47L17 Bureau Atmos + GFDL MOM2	Same but 3 versions, one with bias correction
Ocean data assimilation	OI (Univariate Smith Optimum Interpolation) Temperature	PEODAS (Multivariate pseudo-Ensemble Kalman Filter) Temperature + Salinity
Ensemble generation 	10 members Time-lagged atmos. ensemble No ocean perturbations	30 members Multi-model (3 versions) No time-lagged ensemble Ocean perturbations from PEODAS No atmosphere perturbations in seasonal version

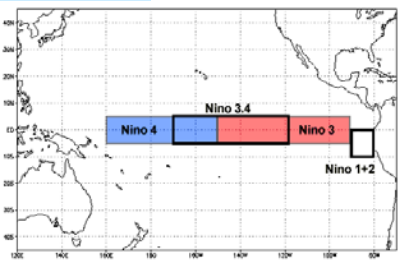
What is the skill of the POAMA system?

- **Based on the hindcast set (1980-2006)**
- **Deterministic and probabilistic skill measures**

(Deterministic forecasts: uses ensemble mean)

Pacific SST skill: Temporal correlation of monthly SSTA





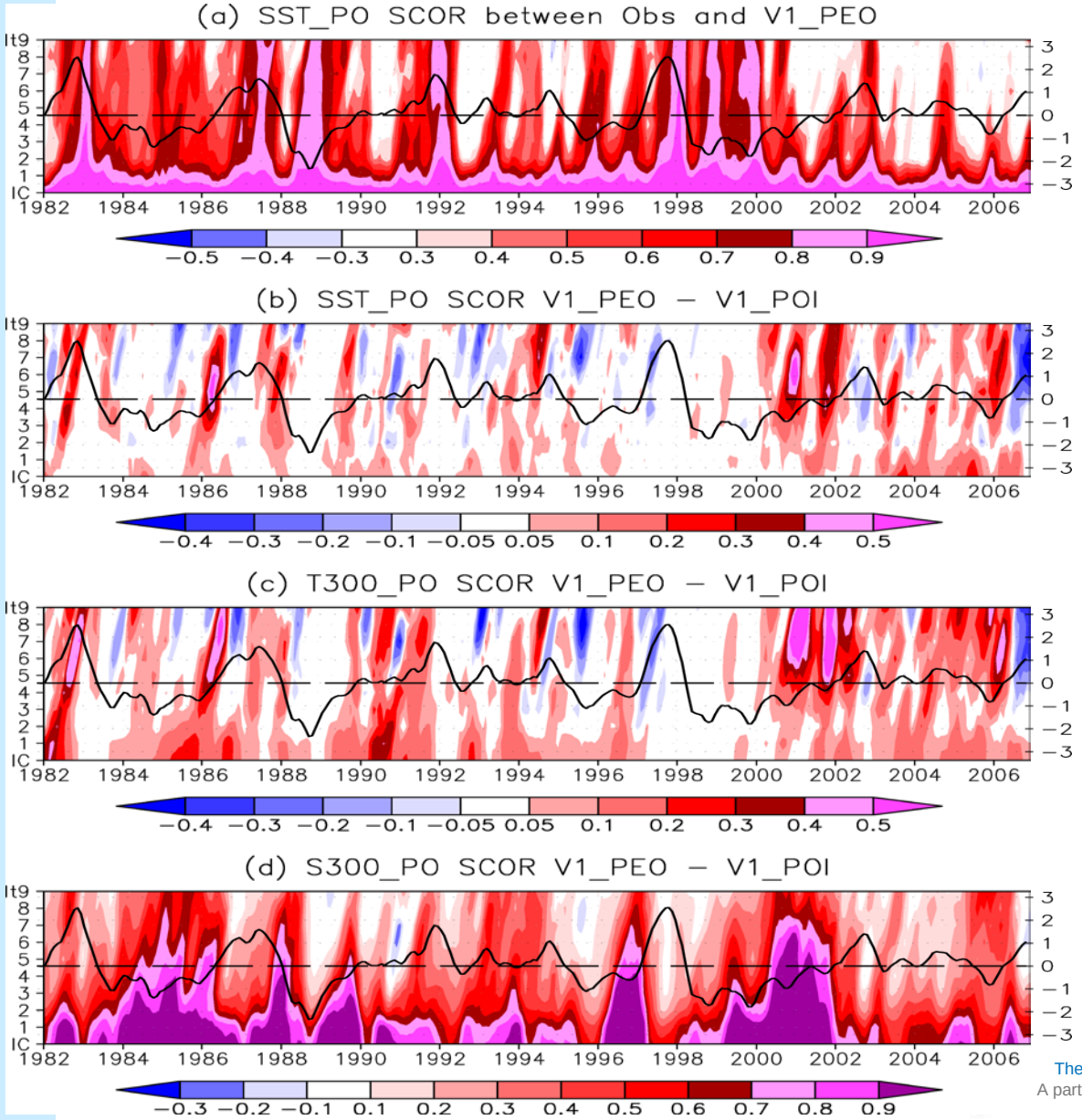
ECMWF System 3

Frontier Research Centre Model (Japan)

NCEP Climate forecast system V1 & 2

POAMA 1.5 & 2

Impact of POAMA-2 assimilation in Pacific



POAMA-2 Skill in Pacific (spatial ACC)

SSTContent

POAMA-2-POAMA1.5 Skill

Heat Content

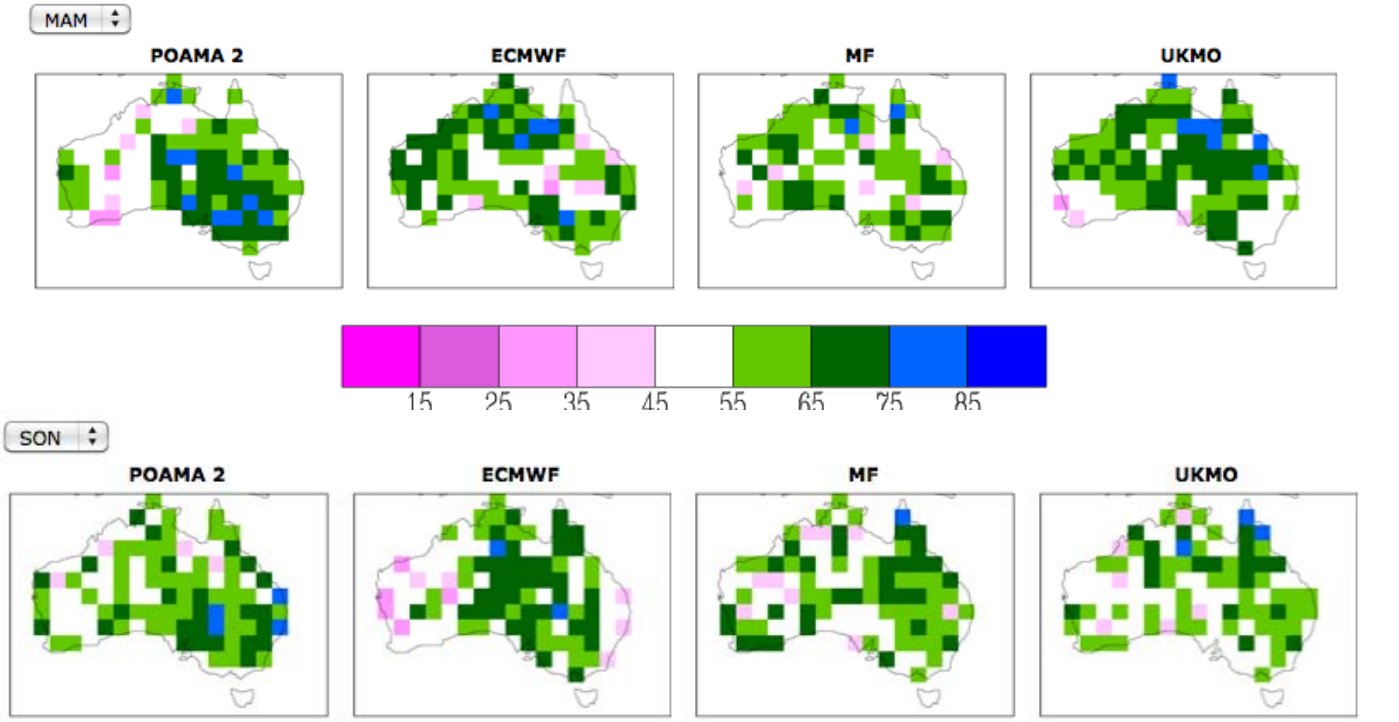
POAMA-2-POAMA1.5 Skill

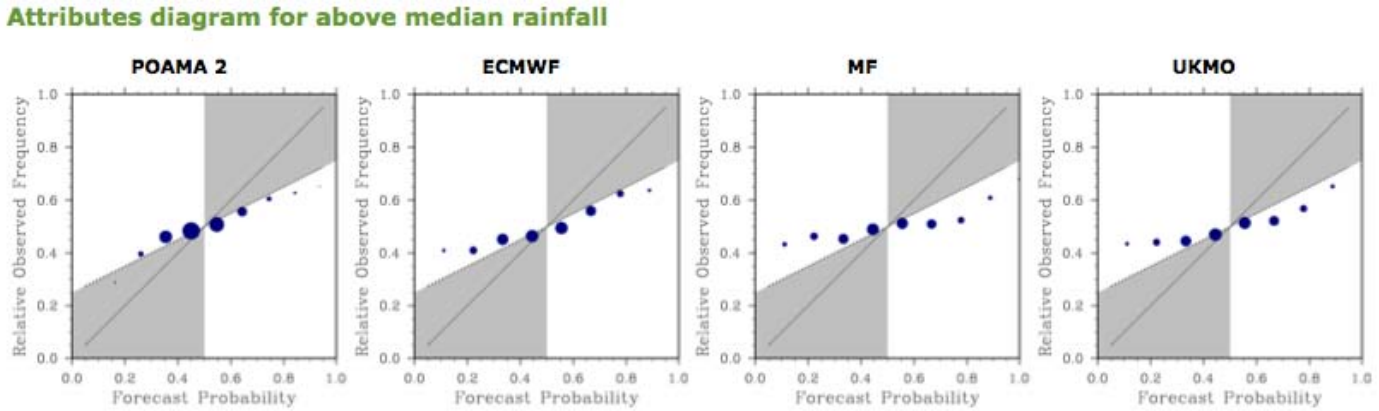
Salt Content

POAMA-2-POAMA1.5 Skill

Skill Intercomparison – Hit rate

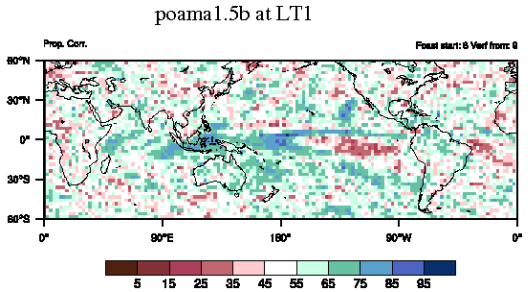
Technical report – Langford et al

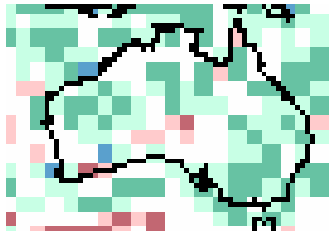


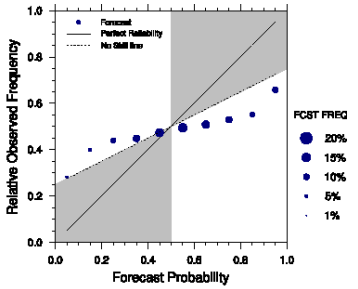


Benefits of multi-model

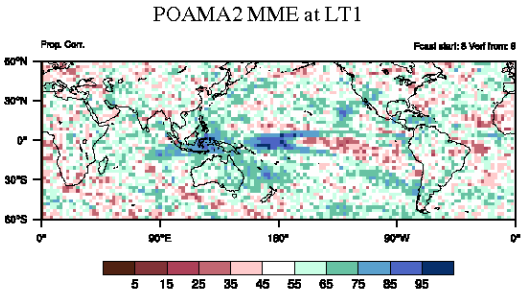
POAMA-1.5

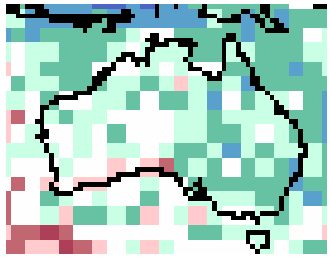


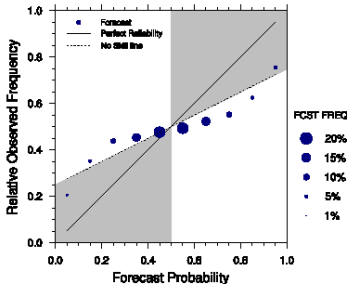




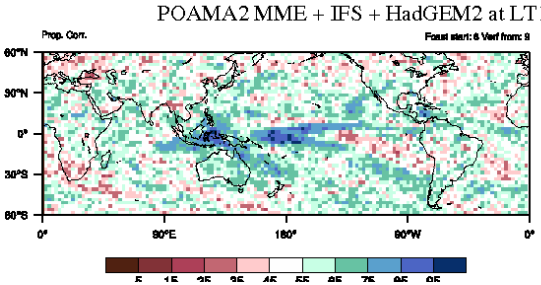
POAMA-2 MME

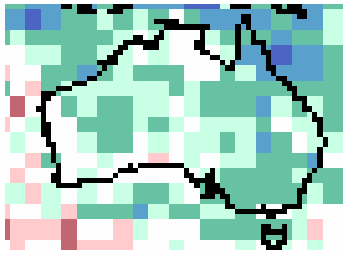


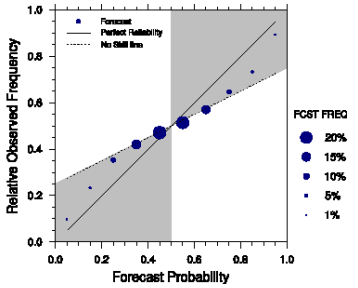




POAMA-2 +EC+UKMO







Australian Government
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A partnership between CSIRO and the Bureau of Meteorology

CSIRO

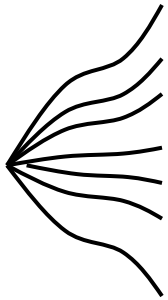
Produced by Eun-Pa Lim

POAMA-2 Intraseasonal system

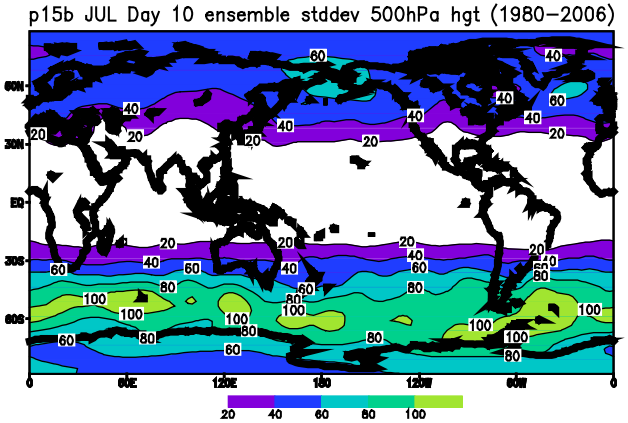
	POAMA-2 (Seasonal)	POAMA-2 (Intraseasonal)
Ensemble generation	30 members Multi-model (3 versions) No lagged ensemble Ocean perturbations from PEODAS; No atmosphere perturbations	33 members Multi-model (3 versions) No lagged ensemble **Ocean and atmosphere perturbations from Coupled Ensemble Initialisation Scheme (CEIS)**
Operational	30 member every 15 days out to 9 months	**33 members every Thursday out to 4 months**

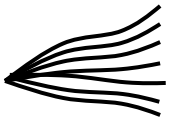
Ensemble Spread (stddev): 500hPa heights (Jul)

Day 10 of the forecast



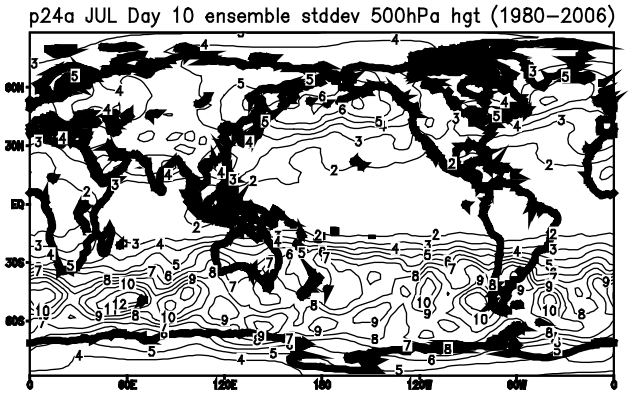
POAMA-1.5

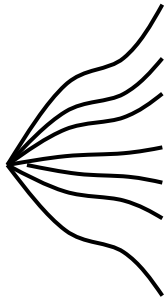




POAMA-2

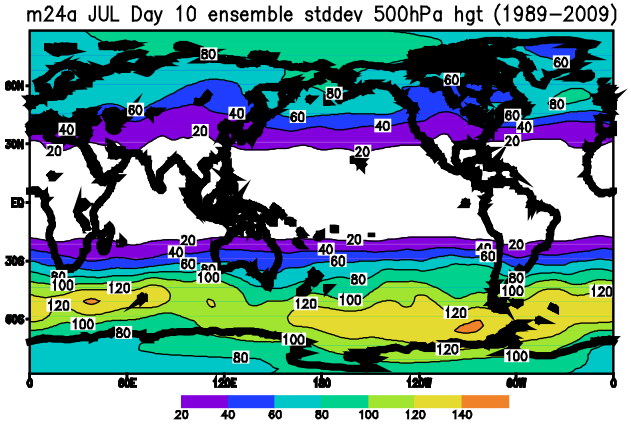
(seasonal)



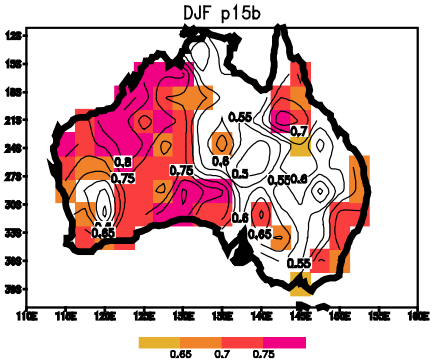
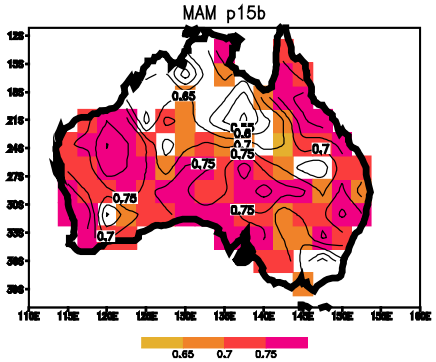
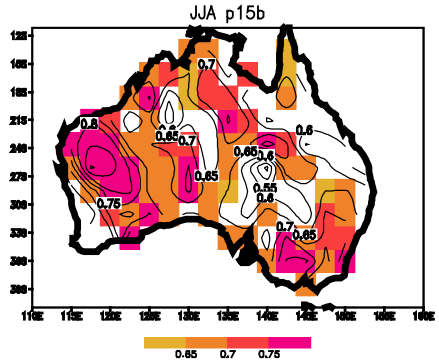
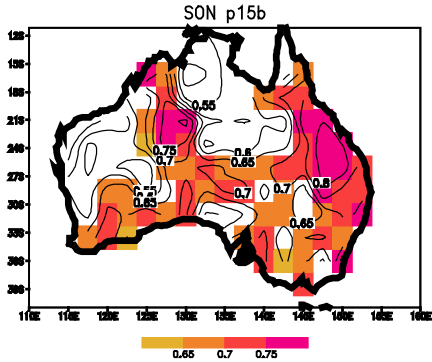
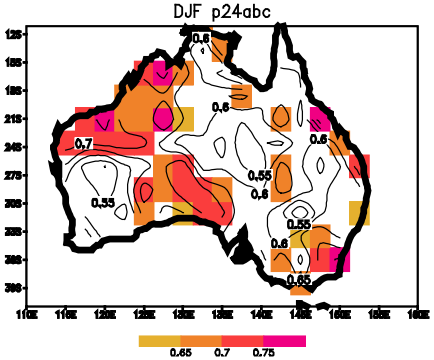
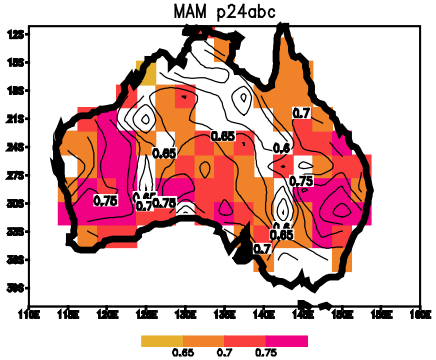
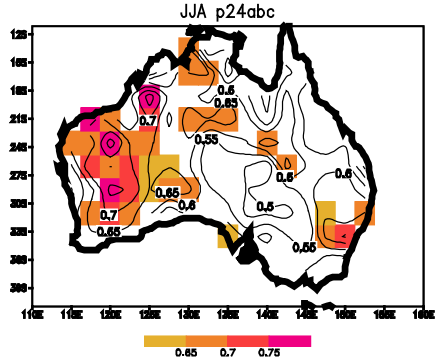
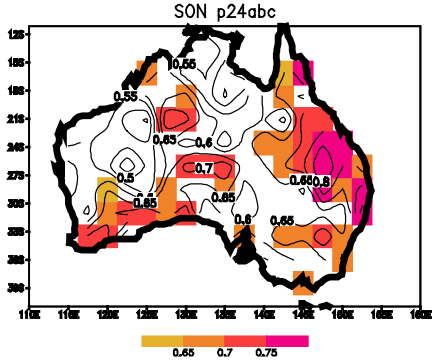
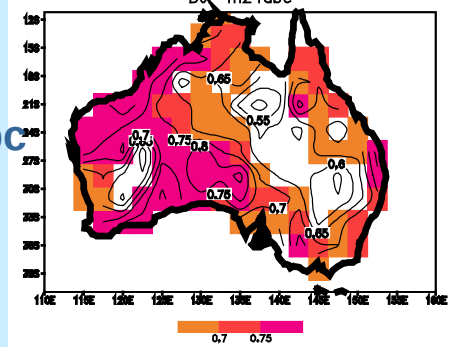
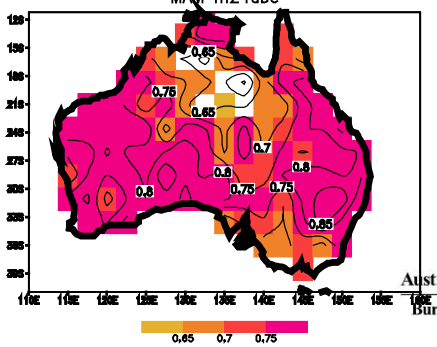
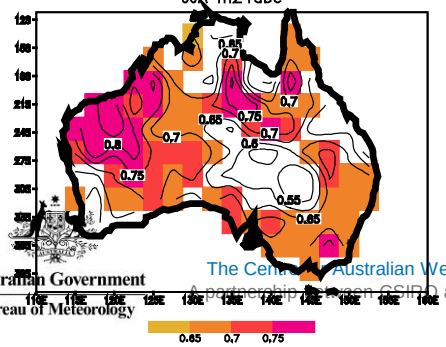
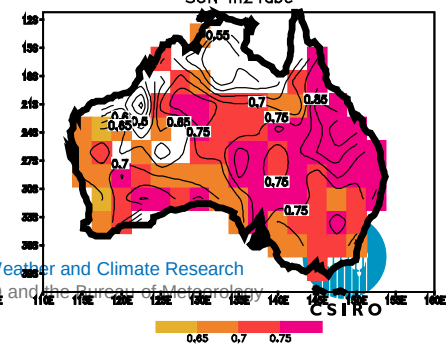


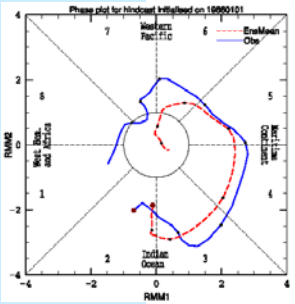
POAMA-2

(intraseasonal)

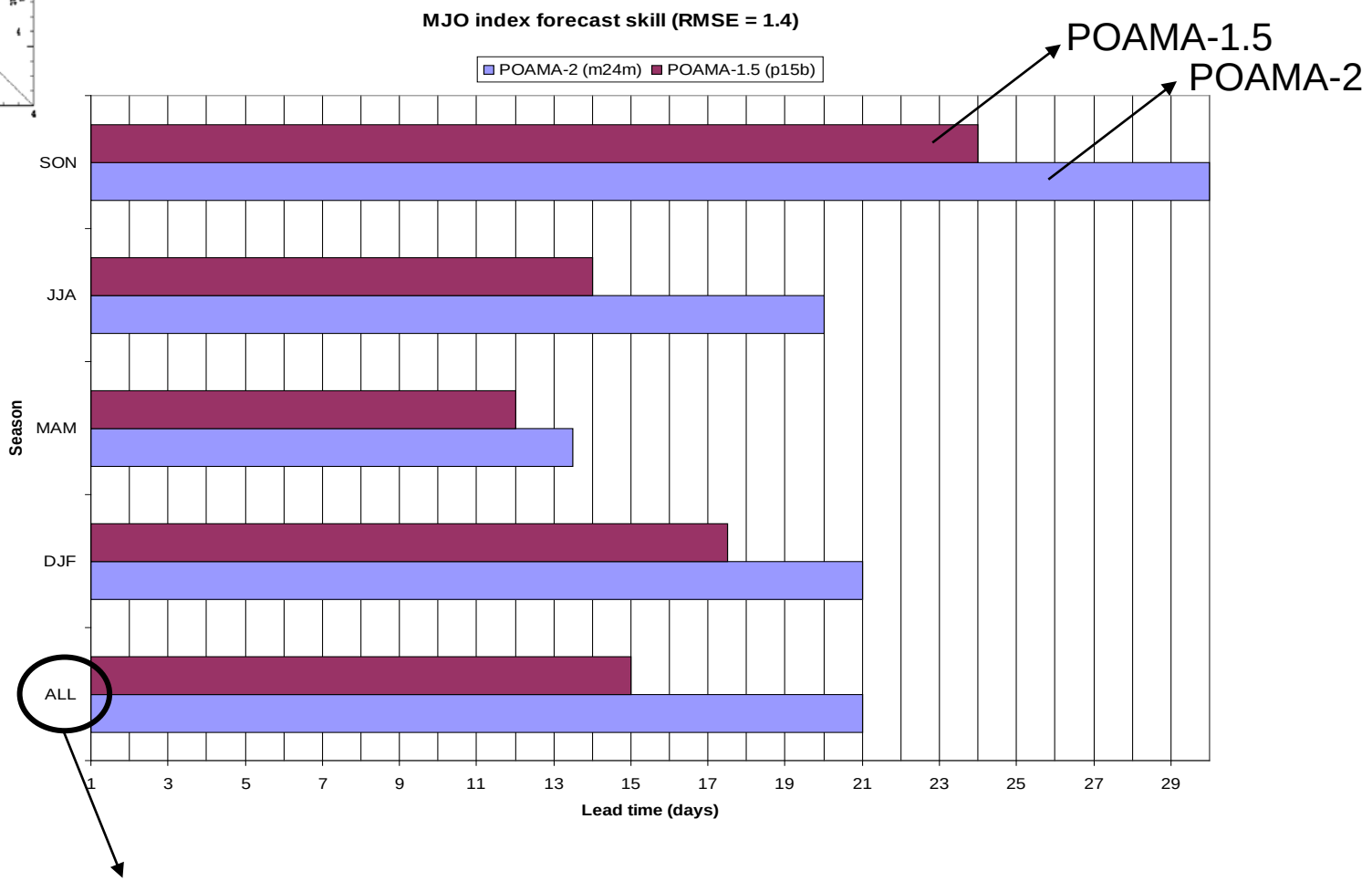


Fortnight 1 ROC: Rainfall above upper tercile

	DJF	MAM	JJA	SON
p15b				
p24abc				
m24abc				



Predicting the MJO Index



Skillful prediction of the MJO out to….

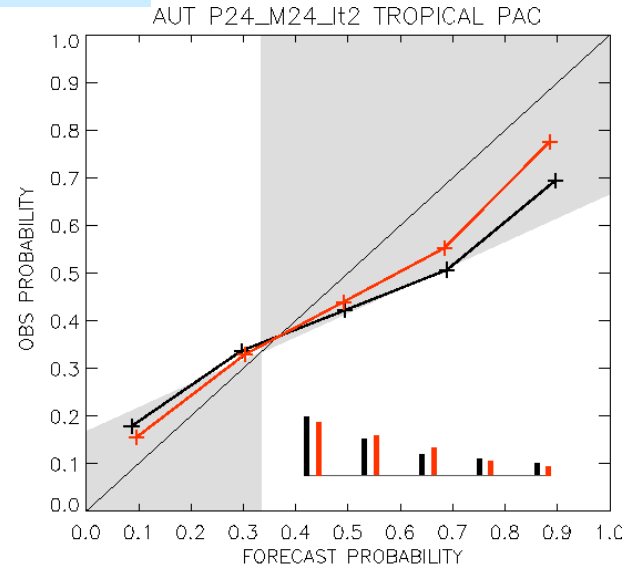
All seasons: POAMA-1.5 15 days
POAMA-2 21 days

A testbed for improvements to the seasonal system

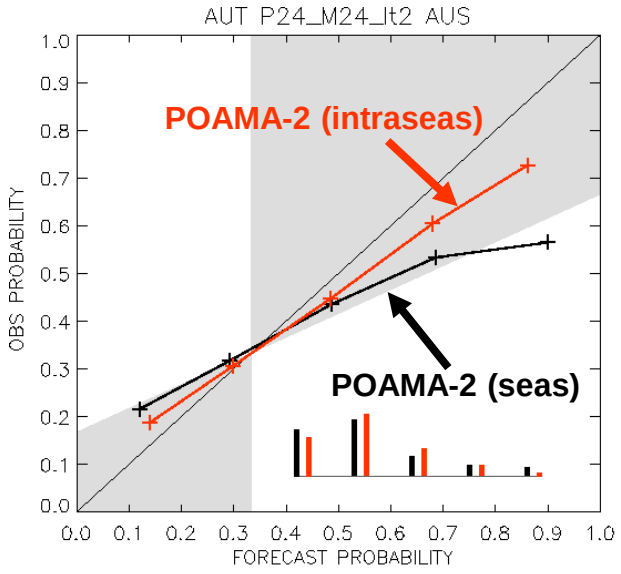
POAMA-2 intraseasonal system has added benefits on the seasonal timescale…

Rainfall (above the upper tercile) Reliability: Skill of **first season**

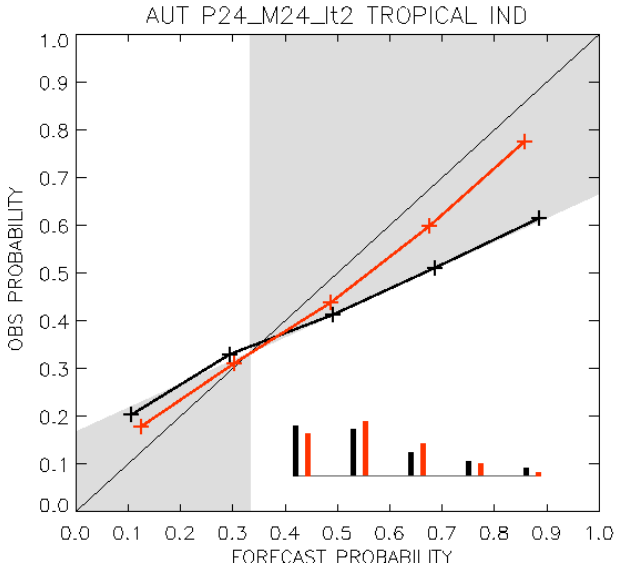
Tropical Pacific



Tropical Indian



Australia



Summary

- POAMA-2 skill comparable to other models
- Pseudo multi-model + breeding method leads to acceptable levels of reliability
- New ocean assimilation improvement in Pacific (salinity role) and marginal in Indian Oceans

Future

- New model based on UKMO atmos and MOM4 (N96L38 – N216L80)
- Coupled breeding + coupled assimilation
- Pseudo-multimodel ? Maybe stochastic physics
- Started some prelim hind-casts