ACCESS-based POAMA

POAMA to Applications Workshop

www.cawcr.gov.au

Patricia Okely
Seasonal Prediction Systems
Climate Variability & Change, CAWCR

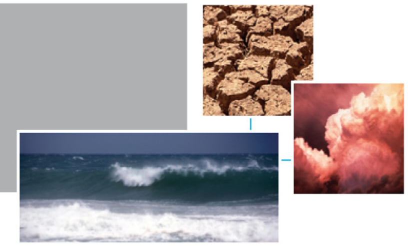
30 Nov 2012

Australian Government
Bureau of Meteorology

The Centre for Australian Weather and Climate Research
A partnership between CSIRO and the Bureau of Meteorology

CSIRO

ACCESS

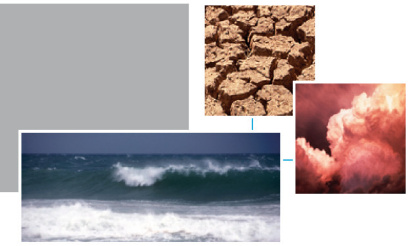


ACCESS

The Australian Community Climate and Earth-System Simulator

- **Atmosphere model is used for Bureau's operational numerical weather prediction**
- **Coupled model climate simulations submitted for IPCC AR5 – compares really well with other international climate models**
- **Collaborative model development between the Bureau, CSIRO and Australian universities**

POAMA-2 System



Data Assimilation

Atmosphere
Land
Initial Condition

Ocean
Initial Condition

Forecast skill depends on ability to depict initial state

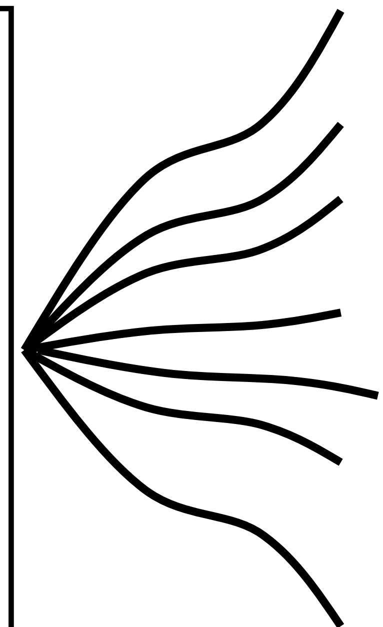
Coupled climate model

ATMOSPHERE
BAM (Bureau)

OCEAN
ACOM (GFDL MOM2)

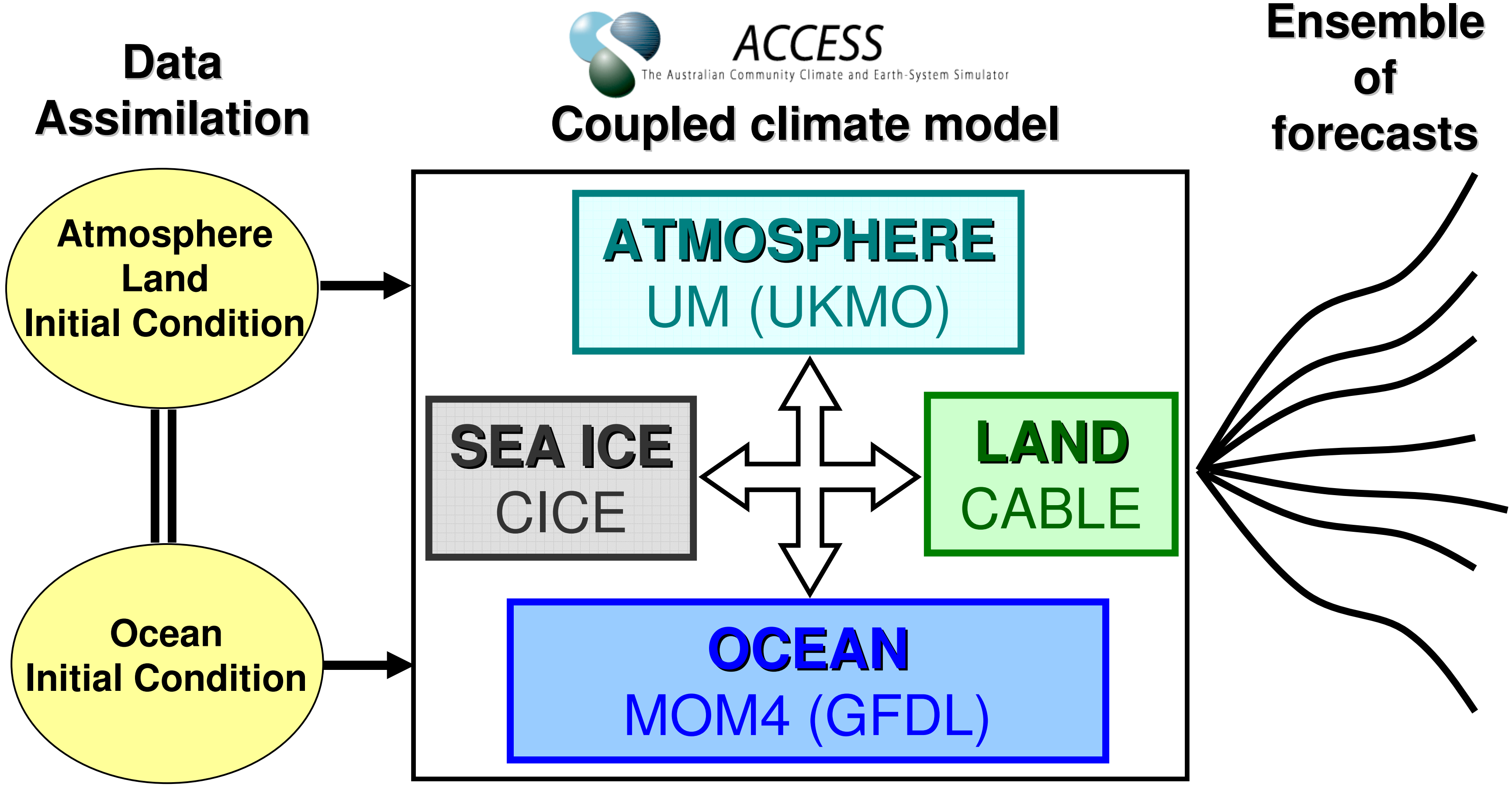
Based on laws of physics i.e. a computer simulation of the real world (e.g. has clouds, solar radiation…)

Ensemble of forecasts



Representing uncertainty and chaos

Introducing… POAMA-3



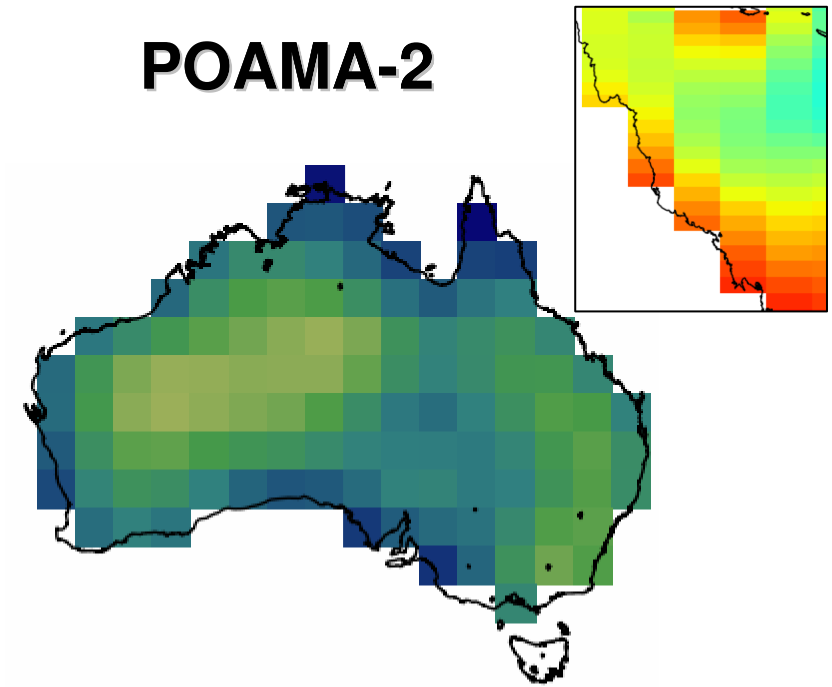
Forecast skill depends on ability to depict initial state

Based on laws of physics i.e. a computer simulation of the real world (e.g. has clouds, solar radiation…)

Representing uncertainty and chaos

Higher spatial resolution

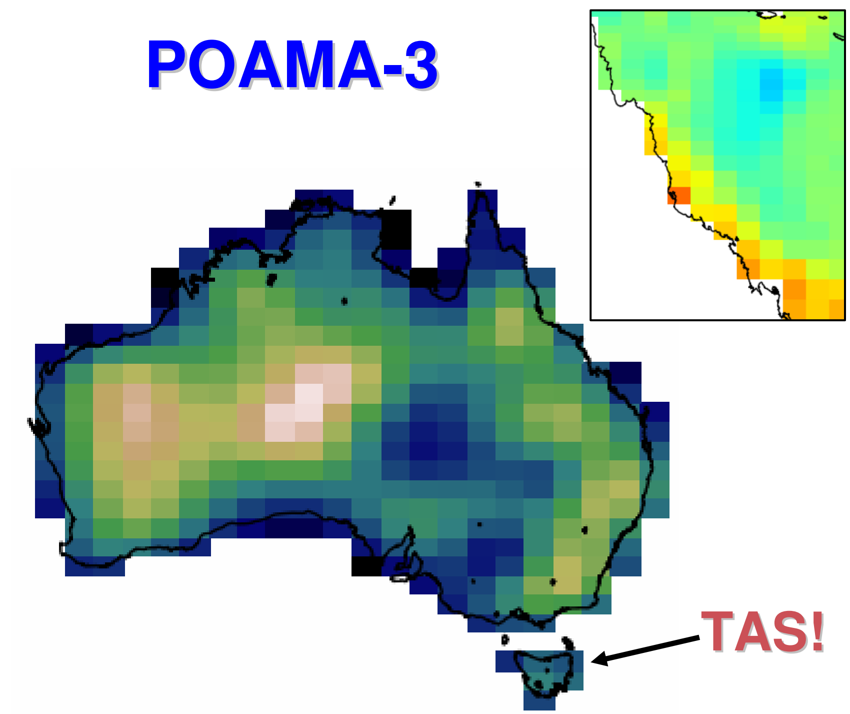
POAMA-2



Atmosphere/Land: ~250km

Ocean: ~200km

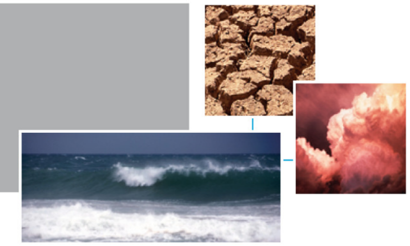
POAMA-3



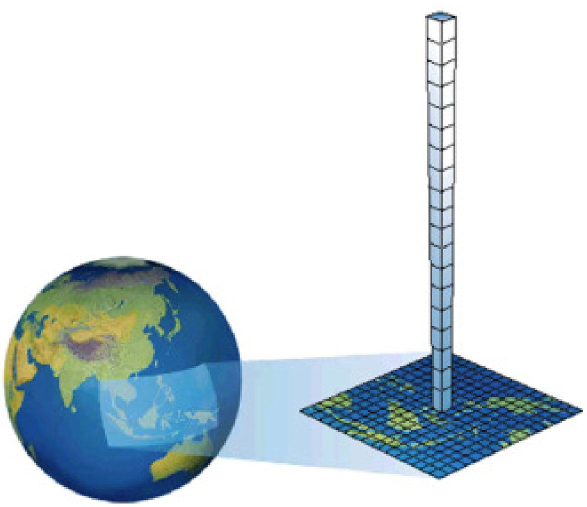
Atmosphere/Land: ~150km

Ocean: ~100km

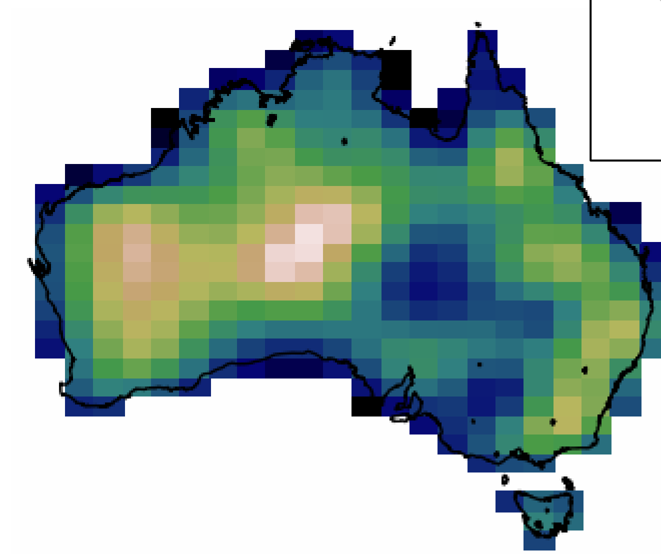
Higher spatial resolution

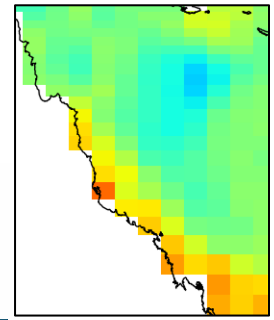


And more vertical resolution – better resolves stratosphere!



POAMA-3

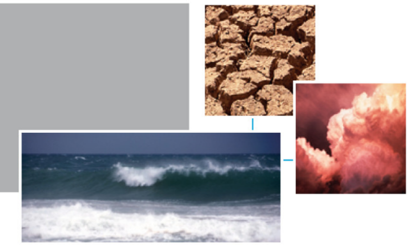




Atmosphere/Land: ~150km

Ocean: ~100km

Other improvements



New sophisticated land surface model (CABLE)

- Developed in Australia
- Increased opportunities for downstream applications

Time-varying greenhouse gases

- Shown to improve forecast skill

New coupled initialisation scheme

- Reduced shock

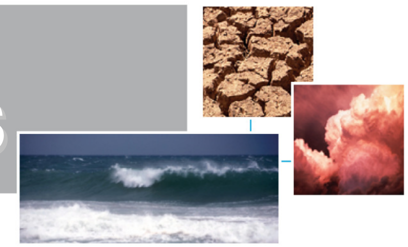
New observations

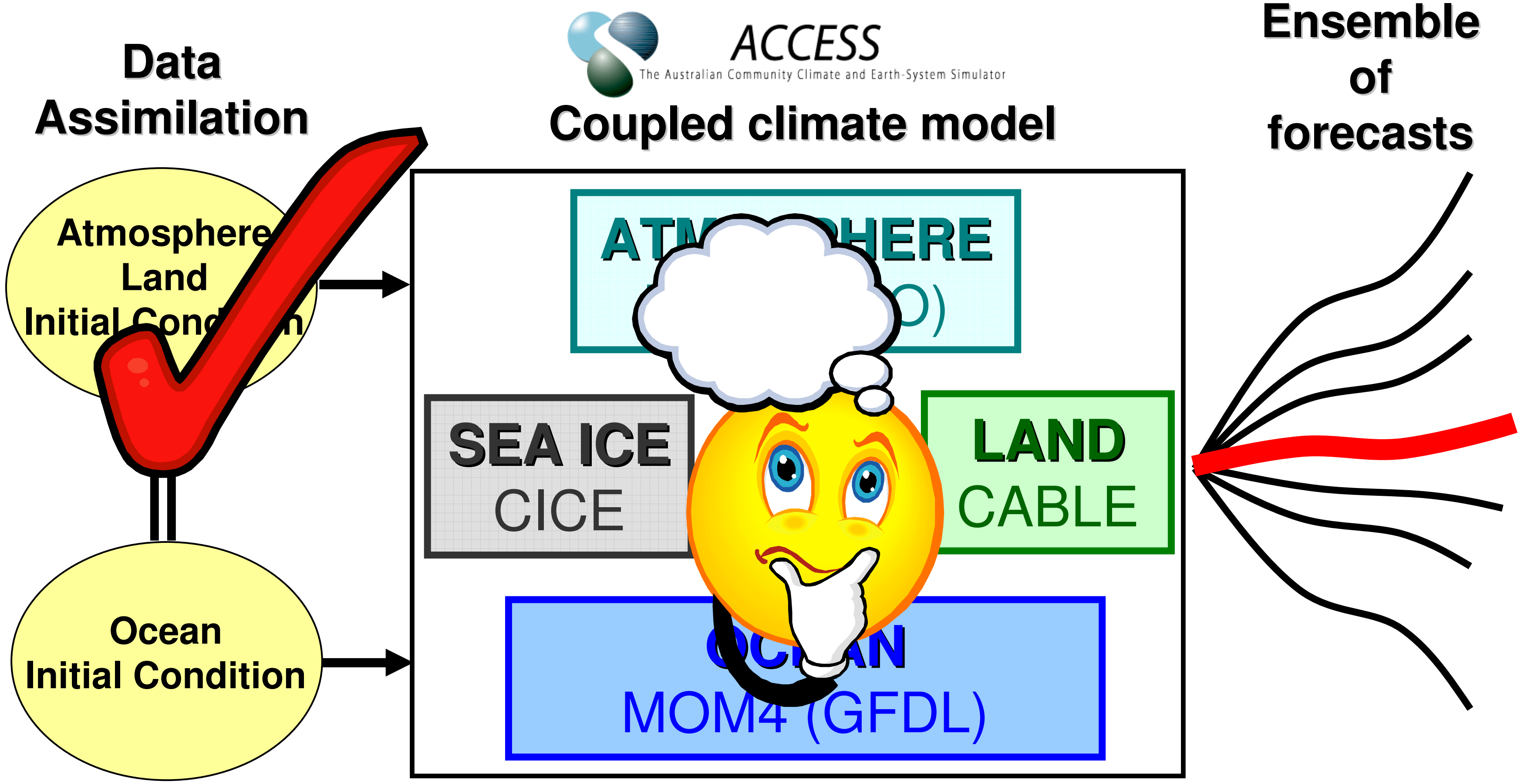
- Raw SST, sea level

Further improvements to ensemble generation

- e.g. better capture model uncertainty (stochastic physics)

POAMA-3… a work in progress



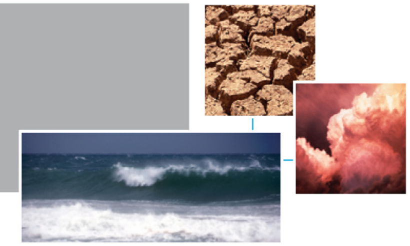


Forecast skill depends on ability to depict initial state

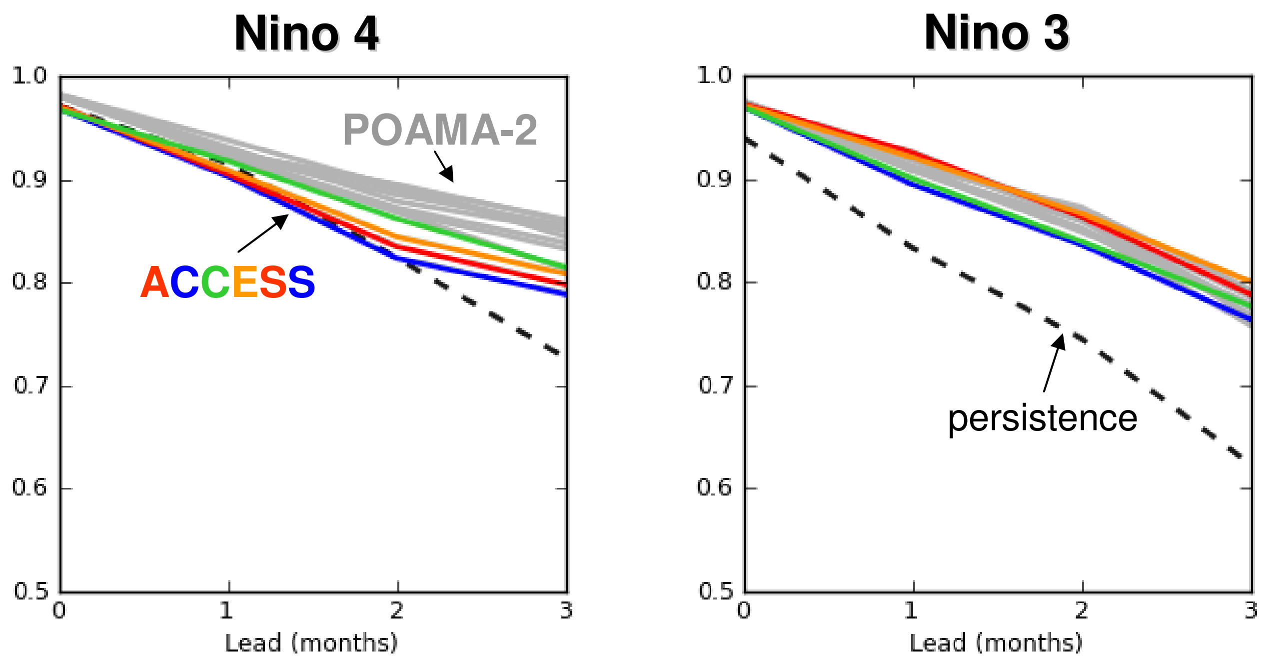
Based on laws of physics i.e. a computer simulation of the real world (e.g. has clouds, solar radiation…)

Representing uncertainty and chaos

First look at new forecasts

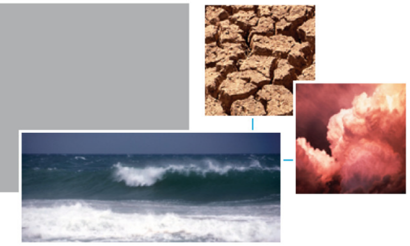


Correlation skill for SSTA Indices



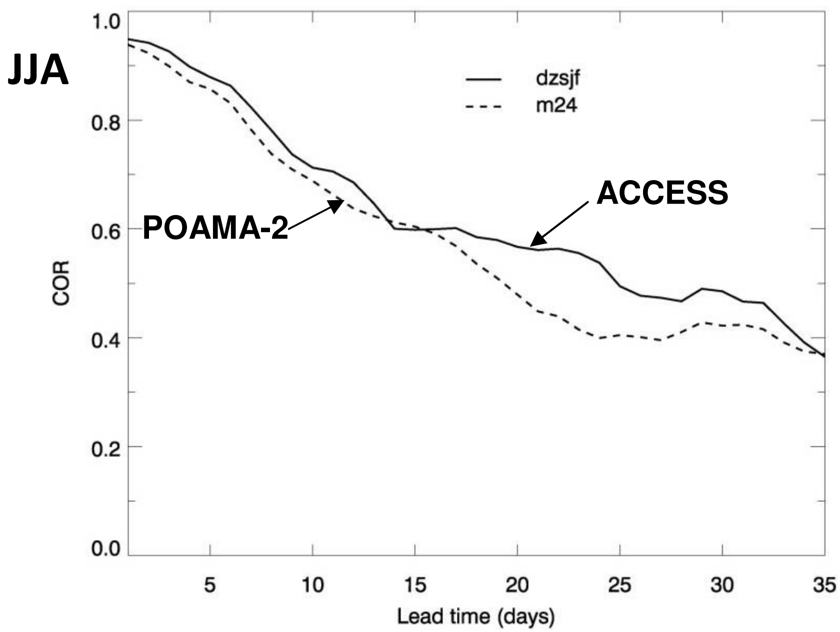
Test runs with ACCESS, using realistic atmosphere and SST initial conditions, but no ocean data for ocean initial conditions and not proper ensemble (yet!)

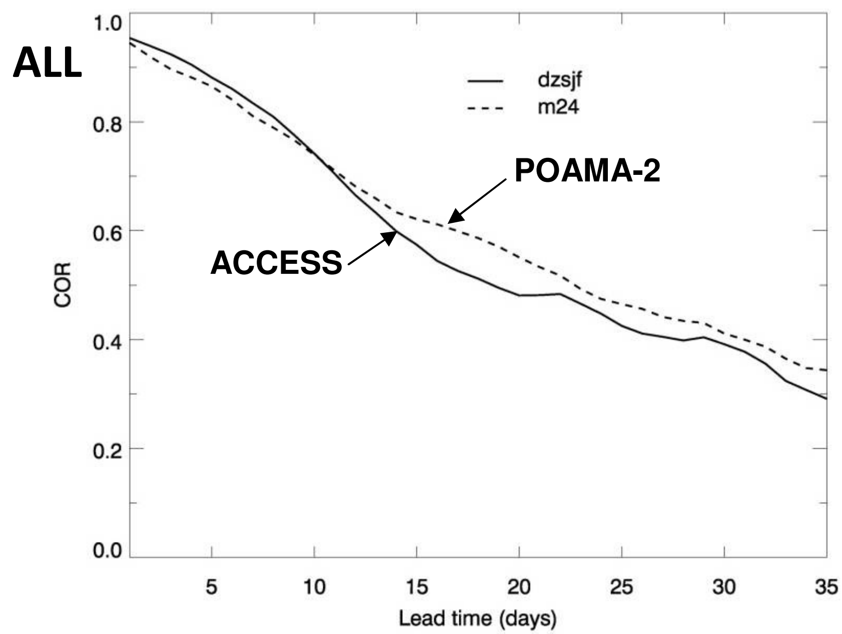
First look at new forecasts



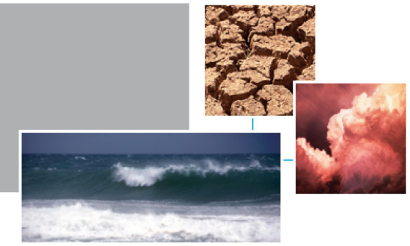
Experiments with atmosphere-only version of ACCESS

Correlation: Predicting the **MJO** Index





Future



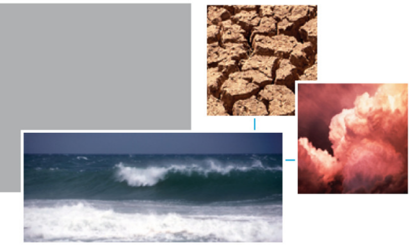
POAMA-3

- 2012-2013: development of trial version
- 2014: reanalyses, hindcasts
- 2015: operational

and beyond…

- increase resolution (75km)
- model improvements
- new observations, e.g. land
- decadal prediction
- other cool stuff

Future



POAMA-3

- 2012-2013: development of trial version
- 2014: reanalyses, hindcasts
- 2015: operational

and beyond…

- increase resolution (75km)
- model improvements
- new observations, e.g. land
- decadal prediction
- other cool stuff

System	Number of grid points	Including time cost
POAMA-2	1,060,000	(current)
POAMA-3	6,460,000	20 x current
Higher resolution POAMA-3	51,700,000	400 x current

Progress will largely depend on available supercomputing…

Australian Government

Bureau of Meteorology

The Centre for Australian Weather and Climate Research

A partnership between CSIRO and the Bureau of Meteorology

CSIRO

Patricia Okely
Seasonal Prediction Systems
Climate Variability & Change, CAWCR

Phone: 03 9669 4868
Email: P.Okely@bom.gov.au
Web: www.cawcr.gov.au, http://poama.bom.gov.au

Thank you

www.cawcr.gov.au