Next Generation Australian Seasonal Prediction System

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The CAWCR dynamical seasonal prediction is called POAMA (Predictive Ocean Atmosphere Model for Australia). POAMA encompasses an end to end prediction systems that includes:

- A coupled model (currently BAM3 with ACOM2)
- Ocean and atmosphere data assimilation systems
- Ocean and atmosphere observations quality control and processing systems
- Ocean and atmosphere ensemble perturbation systems
- A technical infrastructure framework for production of real-time and hind-mode (spanning past 20-30 years) re-analysis and forecasts
- A product generation suite

Successive versions of POAMA are now developed by the CAWCR. This involves development of the different components of the system, the generation of ocean and atmosphere re-analysis for the past two decades, the generation of restrospective hind-casts over the last two decades, product development and skill assessment. POAMA is also run in real-time (analyses and forecasts) by the Bureau's operational department

The POAMA-1 system, which went operational in 2002, was based on what is now legacy coupled model (BAM3.0d+ACOM2) and data assimilation (Smith OI) systems.

Present plans are for a POAMA-3 system, based on the new Australian Community Climate and Earth System Simulator (ACCESS) components, to be available in 3-5 years. The atmospheric model will be based on the UKMO UM version 7 and the ocean component will be based on AUSCOM, which is a local version of MOM4. A prototype system in approx 3 years, and a full operational system with a comprehensive re-analysis and hind-cast set in approx 4-5 years.

In between POAMA-1 and POAMA-3 is a series of transition POAMA versions, each incorporating new components developed as part of ACCESS.

POAMA-1.5 went operational in 2008. One of the new features in this version is the ALI (Atmosphere Land Initialisation System) developed as part of ACCESS and funded by the SEACI-1 project.

The POAMA-2 system, which has now been built and is being used to generate a comprehensive ocean/atmosphere re-analysis and coupled hind-cast set, will be transitioned to Bureau operations in 2009. This version utilizes a new ensemble ocean data assimilation system (called PEODAS) and is based on the state-of-the-art

ensemble Kalman filter approach. It is based on an extension of the BODAS system developed as part of the BLUElink project.

The POAMA-2 system also includes: a new method of perturbing forecast ensembles, which will form the next version of the ACCESS climate ensemble generation technique; a bias correction technique developed as part of the MCVP SWWA project and increased atmospheric resolution (BAM-3.1 T63). In terms of the coupled model the changes from POAMA-1 to POAM-1.5 to POAMA-2 have been very modest. The main improvements have been in the initialization procedures.

POAMA also includes a product generation suite and web page for displaying experimental products (http://poama.bom.gov.au/). These pages present products tailored for specific user groups. The products are independent of the underlying model and assimilation systems.

New versions of POAMA/ACCESS systems takes about 3-5 years from initial development to final operational implementation. This involves 5 phases as follows:
PHASE 1: Building coupled model and data assimilation systems (~1-3 years)
PHASE 2: Conducting ocean/atmosphere/land re-analysis (~1 year)
PHASE 3: Conducting comprehensive hind-cast set (~1 year)
PHASE 4: Transfer of system to BoM operations (~6 months)
PHASE 5: Product development and connection to applications (~2 years)

Because of the long time it takes to develop new versions, a phase of one version is often done in parallel to the earlier phase of the next versions. A present (Dec'08) we are working on the following have:
POAMA-1.5 – Phase 5
POAMA-2 – End of phase 2, start of phase 3
POAMA-3 – Phase 1 (in collab with ACCESS)

Phases 2 and 3 are particularly supercomputer intensive, and their length depends mainly on available supercomputer resources.