WP1: ACCESS Simulation and Modelling Service

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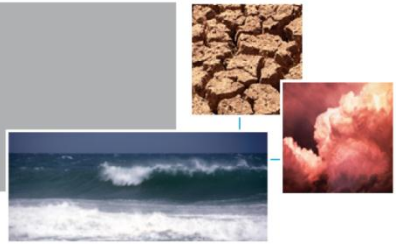
Australian Government
Bureau of Meteorology

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

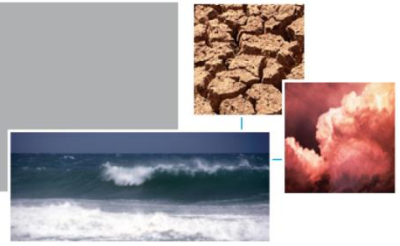
CSIRO

Outline



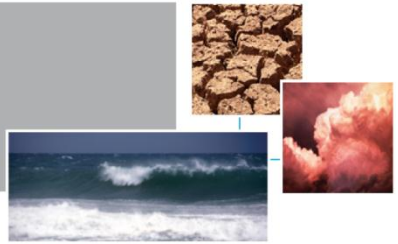
- Current status
- Vision
- Use cases
- Deliverables
- Milestones
- Progress

Current status of ACCESS infrastructure



- ACCESS climate and NWP systems
  - Climate versions used by COE
- Atmospheric model user interface and experiment database on shared machine at NCI
- Shared code repositories at NCI
- Met Office atmospheric model documentation system
  - Scattered local documentation
- ACCESS help at NCI
- Experience running/debugging model in various configurations
- Experience with CMIP5 data processing and publication

Drivers for this project

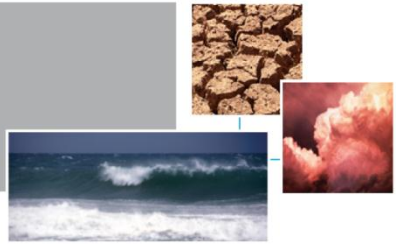


- Existing environment is a hurdle, particularly for new users
  - Coupled model much harder to use than atmospheric model
  - Post – CMIP5 we have some time to think about how to do it better

- New NCI machine
- BOM moving research to NCI
  - Enhances possibilities for new collaborations

- Met Office developing new model technical infrastructure
  - ROSE user interface
  - Experiment repository
  - Cylc (NIWA) for suite control
  - IRIS (python for graphics and analysis)

Vision

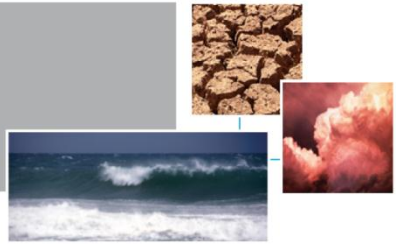


- **Goal is to improve ease of use, reproducibility, support and sharing of code, data and experiments**

- Library of supported and documented standard experiments
    - Including climate, NWP, idealised
- Improved user interface and experiment configuration database for the coupled model
- Implement ACCESS NWP research systems at NCI and make available for wider community
- Adoption of new Met Office technical infrastructure
- Integration with archiving and analysis services

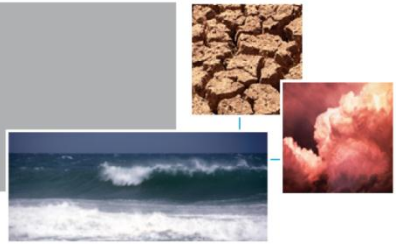
- *Better access to BOM data*

Use case: Testing a climate hypothesis



1. Researcher forms hypothesis
2. Tests using CMIP5 data from ESG
3. Thinks of model experiment to further test idea
4. Selects ACCESS CMIP5 standard experiment as a starting point
   - Runs test case and checks against archived output
5. Modifies code/data appropriately
   - Creates a branch in code repository
   - Uses standard tools to modify ancillary files
   - Uses new coupled model UI to control experiment
6. Runs experiment with data appearing in CMIP5 form in some ESG like catalogue
   - Metadata includes details of code branches and ancillary files
7. Analysis using same tools as in step 2.
8. Publish data to some more permanent storage or go back to step 5

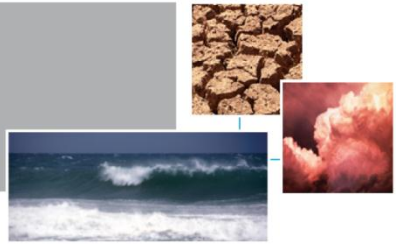
Investigating an extreme weather event



1. Researcher interested in particular extreme event
2. Initial analysis using BOM Australian region analyses and forecasts
3. Decides to investigate effect of model resolution on the simulation

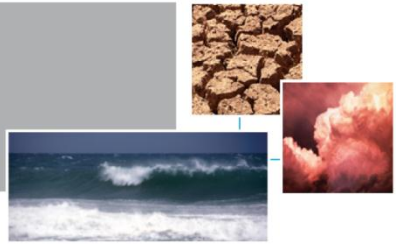
   Event was outside standard high resolution city regions
4. Reruns Australian regional model from archived initial conditions and lateral boundary conditions to generate LBCs for high resolution model
   - Files obtained via catalogue w/o knowing details of file system or archive
5. Runs high resolution model (version of ACCESS-C or 1.5 km relocatable)
6. Analysis and archiving

Library of supported examples



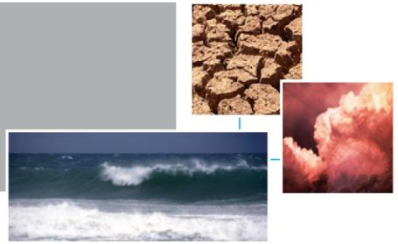
- Documented and supported standard experiments
  - Designed to work for all users
  - Version controlled
- Archived results for comparison
- Standard tools for comparing results from a modified experiment to a standard one
  - Also valuable for testing system upgrades like new compilers
- Kept up to date with new Met Office releases, BOM research APS configurations, ACCESS2 prototypes etc

Library of supported examples



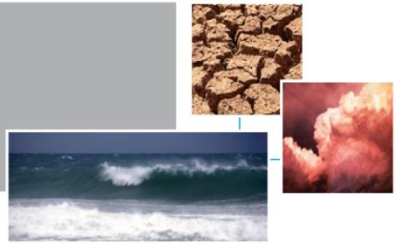
- ACCESS 1.0 & 1.3 configurations
  - Coupled, AMIP, single column model
- ACCESS APS1 NWP configurations
  - Global 40 km
  - Australian region 12 km
  - City scale 5 km, 1.5 km
  - Ensemble
- Seasonal prediction / climate model run from NWP analyses
- Regional climate (nested)
- UKCA (chemistry)
- Met Office GA4.0 configurations (and GA5.0 when available)
- “ACCESS2” experimental versions

Coupled model user environment



- Atmospheric model UI has been valuable
  - Easier to configure model experiments
- A repository for experiment configurations
  - Makes sharing easier
  - Improves reproducibility and traceability, e.g. showing configuration differences
- Extend atmospheric user interface to ocean and sea-ice components and overall experiment control
  - Capture complete coupled model configuration in a repository
  - Integrate post-processing and archiving
  - Use new Met Office tools for the ocean and sea-ice components rather than extending the existing UMUI to the full system,
  - Modify the UMUI to work with new Met Office tools
- ACCESS2 prototype including new atmospheric UI

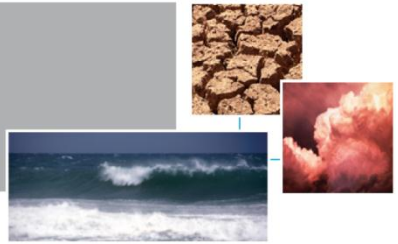
NWP



- Make the current and future BOM research NWP systems available for general use at NCI.
  - Adopt the new Met Office technical infrastructure
  - Move from SMS/SCS suite control to cylc

- *Access to archive of BOM analyses, model boundary conditions etc*

Integration

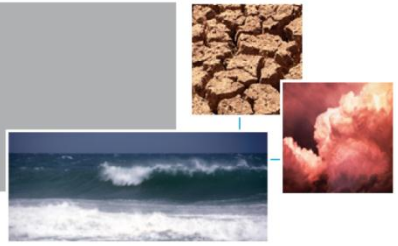


- Model output will be in standard format, written to WP3 catalogue
- Input data, standard case output available from WP3 catalogue

- Model analysis using WP2 tools

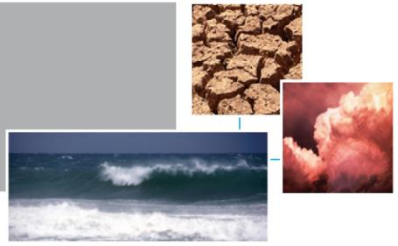
- Documentation, experiment database, links to results via WP4 portal

Milestones



- Dec 2012
  - Initial release of experiment library
  - Coupled model experiment database configuration determined
  - Design of user interface decided
- Apr 2013
  - Initial release of coupled model user interface
  - NWP suite installed at NCI
- July 2013
  - UI and experiment database for coupled model complete
- Sep 2013
  - Modelling service (climate and NWP) available for general users

Development team

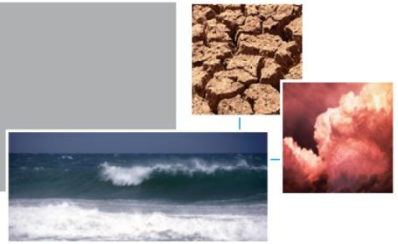


- Martin Dix: Work package leader
- Michael Naughton: Science leader

- Say Teong Ng , Peter Uhe, Ian Campbell, Hailin Yan: Coupled model infrastructure
- Wenming Lu, Asri Sulaiman, Zhihong Li ,Yi Xiao, Ilia Bermous , Robin Bowen: NWP infrastructure
- Greg Roff, David Smith: Standard experiment development

- Mike Rezny, Scott Wales (COE): Acceptance testing, community reference group

Progress



- APS1 city systems running at NCI
- Development of NWP systems using cylc

- Prototype coupled model suite running under cylc
- Prototype UI for ocean component of ACCESS coupled model using ROSE

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Thank you

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