

A brief review of development and application of atmosphere/ocean models at the Bureau of Meteorology and the rationale for development of ACCESS

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Australia has a proud history in all aspects of atmospheric/oceanic research and modelling and has had a prominent profile and impact in international circles. Bureau and CSIRO models have been very well represented internationally in NWP and climate/climate change communities and in major model intercomparison projects such as the Atmospheric Model Intercomparison Project (AMIP), Coupled Model Intercomparison Project (CMIP), Climate of the Twentieth Century (C20C) project and in the assessment reports of the IPCC.

The first real time forecasts using atmospheric models at the Bureau commenced in 1969 using a quasi-geostrophic model. The first operational model based on primitive equations was the hemispheric spectral model SPECPROG which was implemented in September 1977. It is notable that this was a world first for an operational spectral model. The first limited area limited area operational system was the Australian Region Primitive Equation (ARPE) model which was implemented in September 1977 and was nested in SPECPROG. Both systems went through regular upgrades including increased model resolutions, improved physical parametrisations and model numerics, with the key ones being inclusion of data assimilation and the spectral model becoming global. A notable upgrade of the limited area system was a complete replacement of the existing system in July 1996 by a totally new system called the Limited Area Prediction System (LAPS).

In the late 1990s there were clear signs that Australia was falling behind in numerical weather prediction and climate/climate change modelling. This is evident in comparing the Bureau's then operational global model performance (measured through standard WMO scores such as RMS forecast errors and anomaly correlations) with international models operational at major Centres which indicated a clear significant gap between the local operational model and models from international Centres. Another indication was our decreased contributions to international climate/climate change intercomparisons. A key reason for the falling behind was inadequate resources to support and continually improve these complex modelling systems to keep up with the rapidly developing state of the science. One possible and effective way of halting the slide was to pool resources and develop a unified Australian coupled modelling system. After extensive discussions between the Bureau and CSIRO a decision was made to jointly develop, with help from the University sector, the Australian Community Climate and Earth System Simulator (ACCESS).

The presentation will give a brief justification and history of the key developments of the Bureau's NWP systems followed by the key steps in the development of ACCESS.