# BoM ACCESS-GE global ensemble numerical weather prediction systems

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BoM has been developing and running ensemble numerical weather prediction systems in research mode since the second half of the 1990's, originally based on the Australian global and regional NWP systems, and then on ACCESS versions of the UK Met Office MOGREPS systems.  Up until now, these EPS systems have been run in research demonstration and operational trial versions.  ACCESS NWP systems are scheduled to become operational in the first half of 2019.

The first Bureau global EPS (GASP-EPS) was developed for the Bureau's GASP global spectral model using the singular vector initial conditions perturbation method developed at ECMWF.  It was run quasi-operationally in the Bureau's operational suite from 2002 to 2009.

An Australian region EPS (LAPS-EPS) was developed and run from 2002-2005, based on the Bureau's Australian region LAPS system, which included both perturbed initial conditions and perturbed physics.

From 2006 onwards, BoM, CSIRO and Australian universities started the Australian community climate and earth systems simulator (ACCESS) national partnership. ACCESS NWP systems are predominantly based on the corresponding UK Met Office Unified Model (UM) systems.  The global ACCESS-G system became operational in 2009.

The ACCESS-GE global EPS system was developed from 2007 onwards, based on the MOGREPS-G system.  ACCESS-GE has been running routinely in near-real-time since around 2010.

Skill performance of both the GASP-EPS and ACCESS-GE EPS systems has been comparable to operational EPS systems in other major world meteorological centres.

The current ACCESS-GE2 60 km resolution version has been running routinely since 2014 as a demonstration system.  ACCESS-GE2 has been used by several groups to develop downstream ensemble products.

The ACCESS-GE3 version currently running in pre-operational trials is planned to become operational in 1Q 2019.  It is based on the 2017 Met Office PS39 system, at 33 km resolution.

ACCESS-GE3 skill improves upon ACCESS-GE2, in line with forecast skill improvement of ACCESS-G3 relative to ACCESS-G2.

There are a number of major differences in the upgrade from APS2 to APS3, which all contribute to the forecast improvement:

* EPS: ​increased number of ensemble members, additional forecast model perturbations;
* Model: increased resolution, change from new dynamics to ENDGame UM dynamical core;
* Data assimilation: hybrid ensemble 4D-VAR, upgraded background error covariances and introduction of new observations sources.