An Overview of ACCESS-G4/GE4

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ACCESS

- ACCESS: Australian Climate and Earth-System Simulator
- G4/GE4: upgraded version of the Bureau's global NWP model that will replace G3/GE3.
- Based on the Met Office Parallel Suite 45 (PS45)

SPECIFICATIONS

G4	Horizontal resolution	12km
	Number of vertical levels	70
	Number of runs per day	2x10-day, 2x3.5-d
GE4	Horizontal resolution	33km
	Number of vertical levels	70
	Number of runs per day	4 x 10.25-day
	Number of ensemble members	18

MODEL UPGRADES

- Improved cloud & moisture assimilation in both G4/GE4
- Increased use of ensemble errors-of-the-day in G4
- More sophisticated method to generate ensemble perturbations (En-4DEnvar)

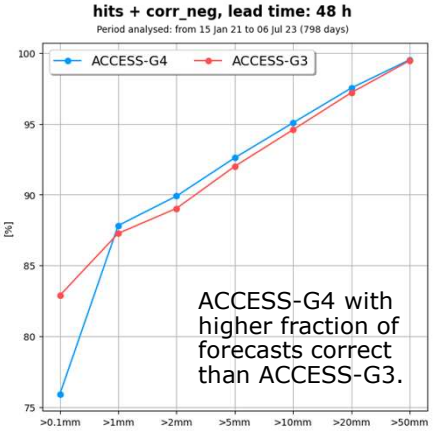
TRIAL

hindcast | real time

Jan 21 — Oct 22 — present

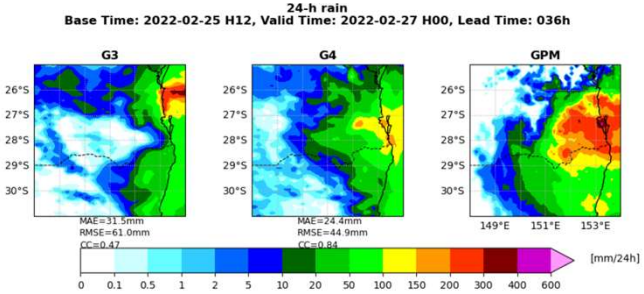
- Running on Australis non-prod
- Will be ported to the new Bureau's supercomputer (Eastern Data Centre)
- Will become operational in August 2024

VERIFICATION - AUSTRALIA

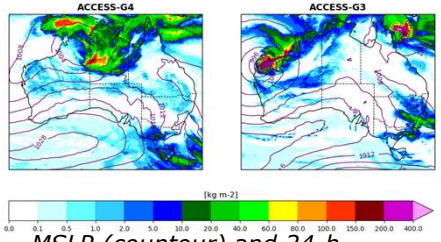


ACCESS-G4 with higher fraction of forecasts correct than ACCESS-G3.

Metrics generated by RAINVAL



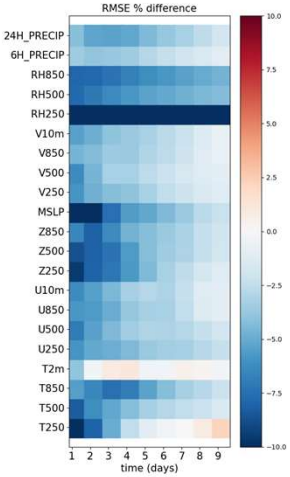
- Both ACCESS-G models under forecast total daily rainfall on this event.
- A well-known weakness of ACCESS-G3 with heavy rain being confined to the coast seems to improve in ACCESS-G4.



MSLP (countour) and 24-h rainfall at lead time 180h and base time: 2023-02-21 12z

- Internal tool to monitor real-time forecast differences between the two versions.
- ACCESS-G3 over predicted TC formation during 2022-23 season for long lead times.
- ACCESS-G4 was more aligned to other models, including IFS-ECMWF.

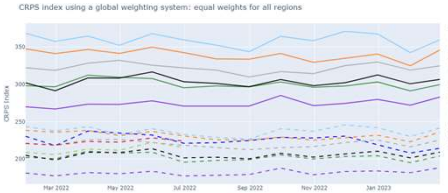
VERIFICATION - GLOBAL



- Improvement in ACCESS-GE4 for most fields, more notable for short lead time.
- Spread is reduced in ACCESS-GE4 (not shown). However, this is expected as the forecast error is smaller.

Scorecard of the RMSE difference of ensemble mean during JFM 2022 using ERA-5

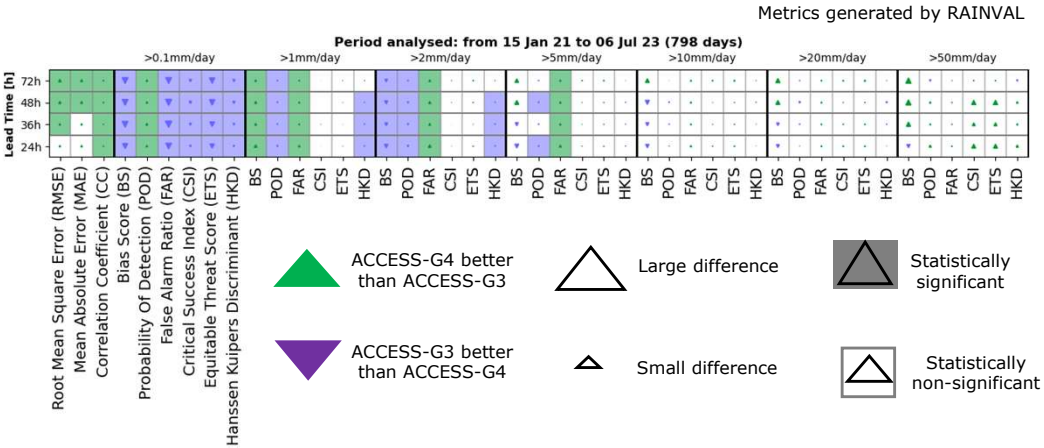
Provided by Meelis Zidikheri



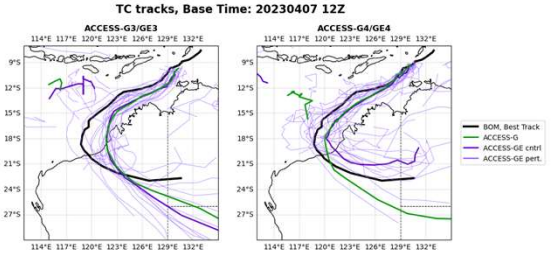
Provided by Reza Khanarmuei

- Both ACCESS-GE4 control and perturbed members are in line with UKMO's model performance

Metrics generated by RAINVAL



- Overall, ACCESS-G4 outperforms ACCESS-G3 for all lead times.
- For light precipitation, false alarms are higher in ACCESS-G4.
- For heavy precipitation, no big differences are found between the two versions.



- ACCESS-G4/GE4 performed better than G3/GE3 in forecasting TC Ilsa track, especially when making landfall, 6 days ahead.
- However, its intensity was better captured by ACCESS-G3 (not shown).

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