

Australia's ACCESS-CM2 climate model

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Australia's coupled model is currently available at two ocean resolutions, 1° and 0.25°. What simulations or new configuration do you require to answer your next research question? Let us know!

Why coupled modelling?

- Atmosphere-ocean interaction is an important component of the Earth's climate system.
- Coupled models directly simulate
 - heat and freshwater fluxes,
 - momentum transfer.
- Including more climate components comes at the cost of grid resolution.

Earth System Model vs Climate Model

- Earth System Models (ESM) directly simulate CO₂ concentrations from given emissions (active carbon cycle) while Coupled Models (CM) have prescribed CO₂ concentrations.
- ACCESS-ESM runs faster due to reduced atmospheric vertical levels.

Existing ACCESS-CM2 configurations

ACCESS-CM2 comes currently at two ocean resolutions, 1° and at 0.25°, with the same atmospheric resolution.

Biases remain

- Biases that are present in the coarse model remain largely in the higher resolution model.
- Above suggests the biases stem from the model code (e.g. cloud parameterisation) rather than model resolution.

Improved ocean mesoscale in mid-latitudes

- Ocean circulation in regions of high eddy activity in the mid-latitudes much improved in the 0.25° configuration. (Fig 1)
- Signal translates to atmosphere (e.g. surface air temperature).

Deep convection in high latitudes problematic

- Unrealistic strong multidecadal variability due to periods of excessive convection in the North Atlantic; dominates global SST signal. (Fig 2)
- Open ocean convection in Southern Ocean

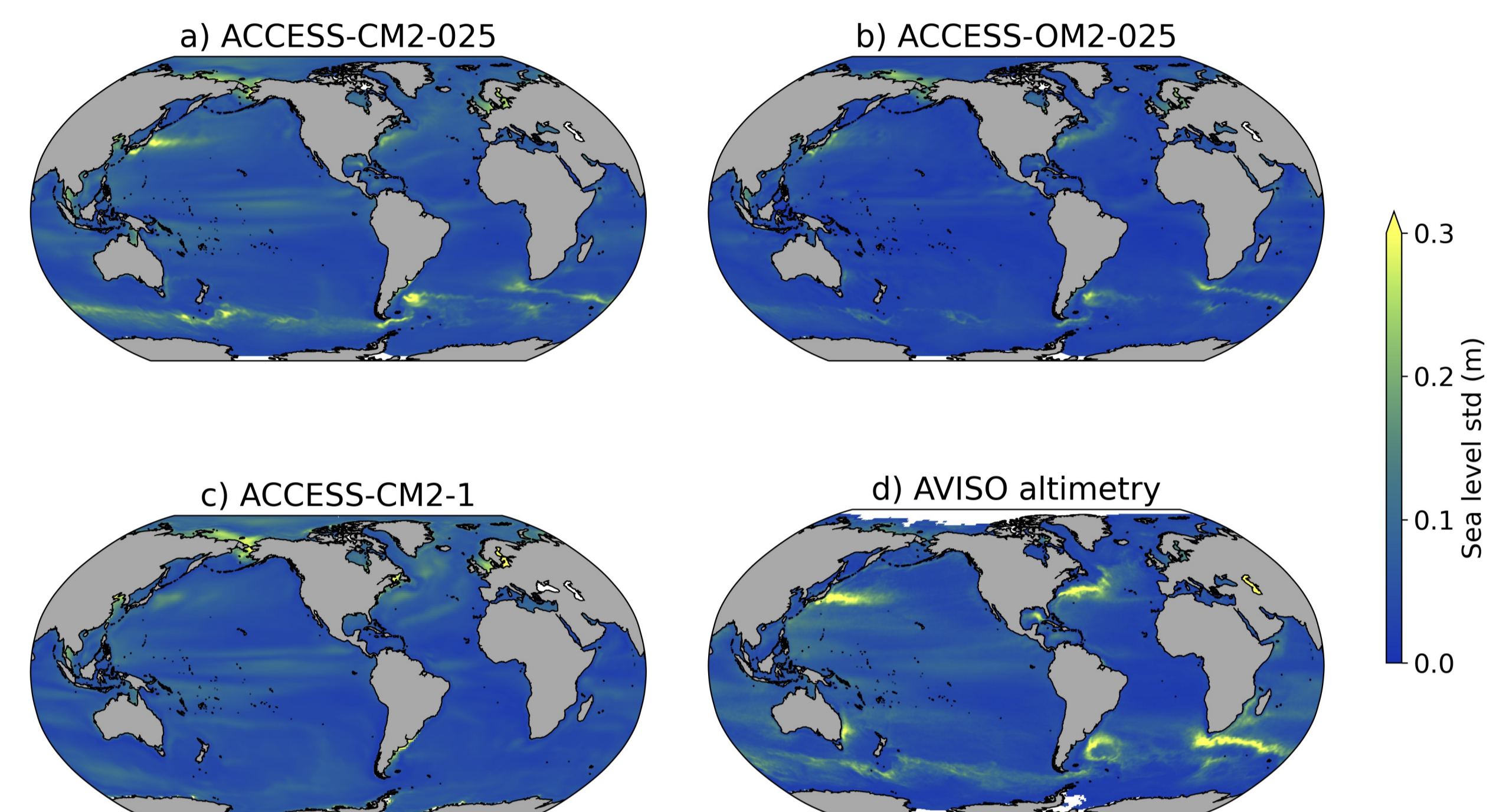


Figure 1: Sea level standard deviation as a measure of flow variability. CM2-025 is closest to observed estimates (AVISO).

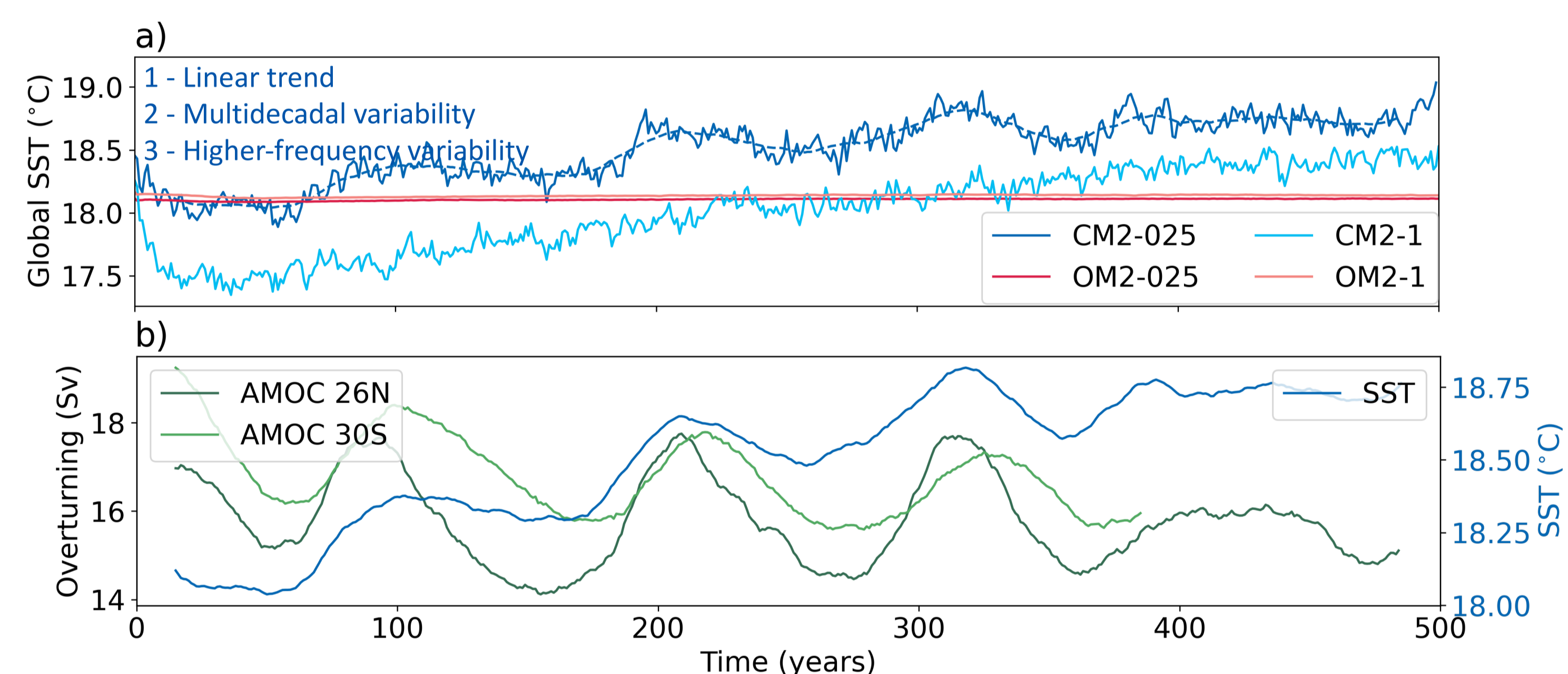


Figure 2: Time series of annually averaged a) sea surface temperature, b) Atlantic Meridional Overturning Circulation. Both time series inhibit strong multidecadal variability.

ACCESS-CM2 overview

Model components

UM (atmosphere) CABLE (land) MOM5 (ocean) CICE5 (sea ice)

Configuration	ACCESS-CM2-1	ACCESS-CM2-025
Resolution	1.85° x 1.25° (atm) 1° (ocean)	1.85° x 1.25° (atm) 0.25° (ocean)
Simulation	Historic, present day, future scenarios	present day
Performance	5.8 kSU/yr 5.5 yr/day 672 cores	12.5 kSU/yr 4.3 yr/day 1152 cores

What are you interested in?

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ACCESS-CM2-025

- Historic simulation
- Future scenario

New configurations

- Higher ocean resolution (0.1°)
- Higher atmospheric resolution (N216)
- ACCESS-CM3

Specific model output

- High spatial/temporal resolution
- Other (what?)