ACCESS-NRI support of high-resolution modelling in non-operational settings

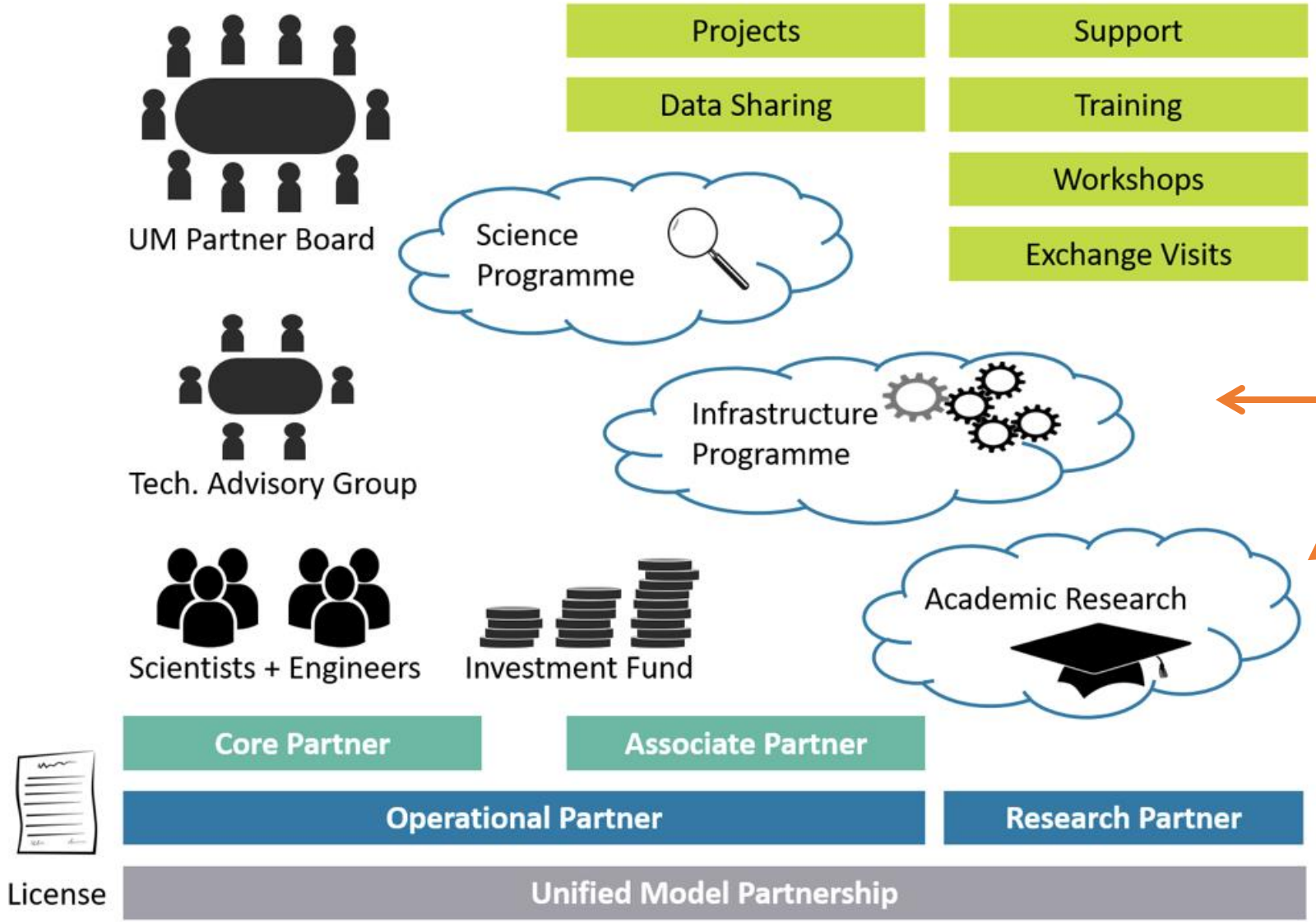
Chermelle Engel, Martin Dix and Andy Hogg

and many others

Australia's climate simulator

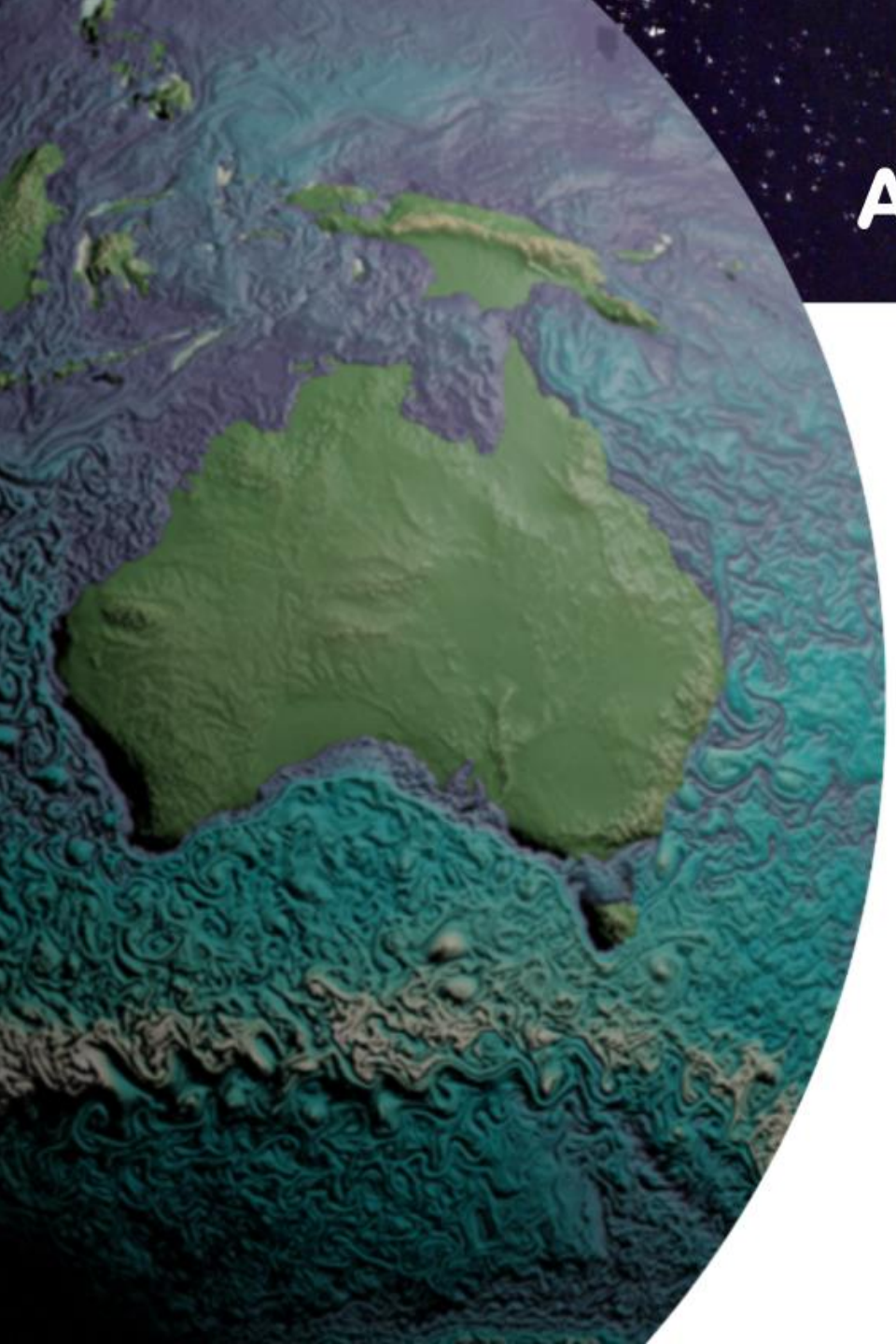
ACCESS National Research Infrastructure

Unified Model Partnership: Collaboration



https://www.metoffice.gov.uk/research/approach/collaboration/unified-model/partnership

ACCESS
National Research Infrastructure



ACCESS-NRI
Australian Earth System Simulator

WHAT WE DO

- **Create** and **curate** open-source software infrastructure in collaboration with Australian research communities
- **Build** the capability of Australian climate science, observations and high performance computational modelling research
- **Support** software, tools and documentation for the ACCESS community
- **Develop** transparent, quality-assured climate prediction systems and **enhance** current Australian climate modelling systems

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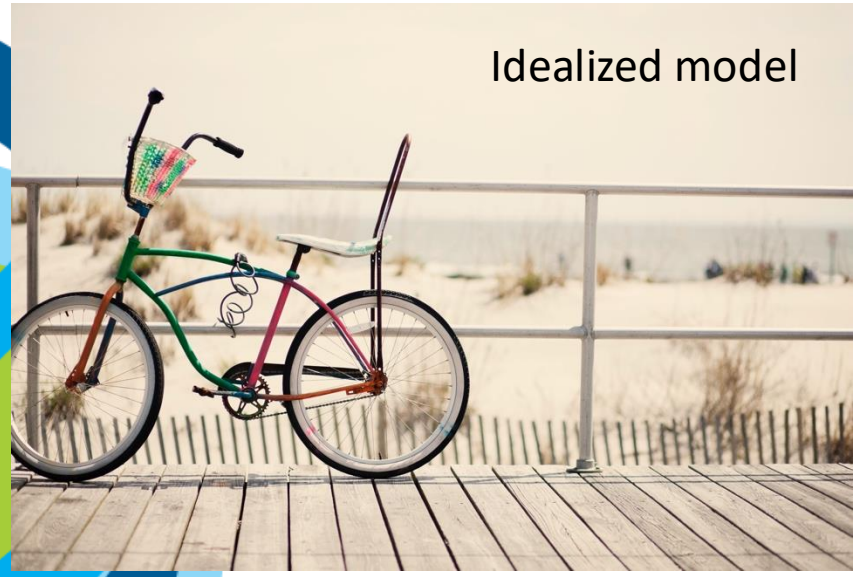
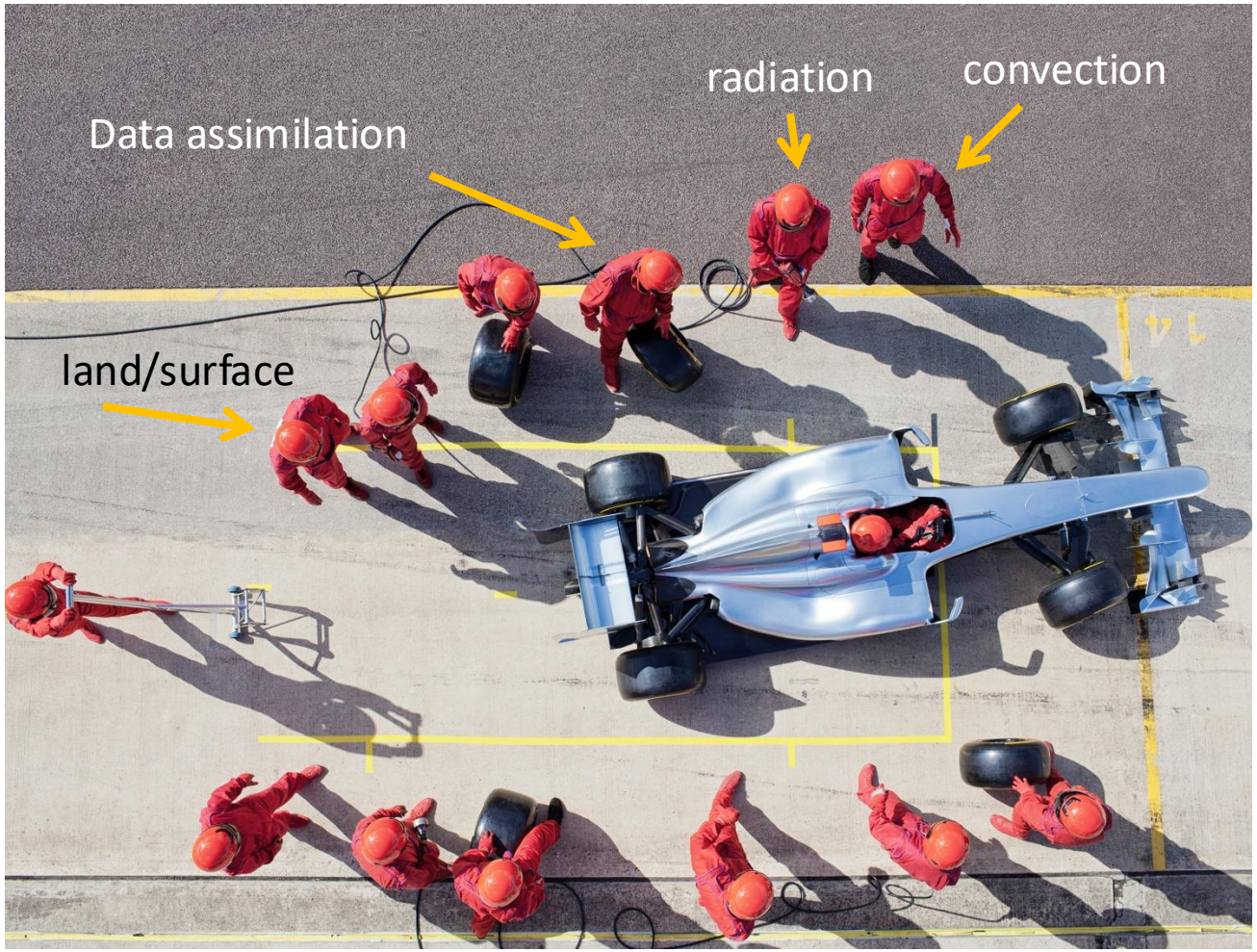


Researchers at universities are time-strapped and have different levels of experience.

Momentum Partnership

many more teams!



Researchers benefit from the wisdom of many teams.

May have the honor to contribute.

But it is intimidating and there are hurdles in non-operational settings.

Limited Area Modelling

Operational setting

Use UM as a driving model

i.e. BoM operational (150 variables)
BARRA-R2

Non-operational setting

Use ERA5 as a driving model

Repackage ERA5 (19 parameters) into start dump (with 150 variables)

Replace land/surface (9 parameters) from higher-resolution sources

Differences in what is available at different sites.

Researchers at universities may want to explore other dates/regions than operational centers (i.e. historical events)

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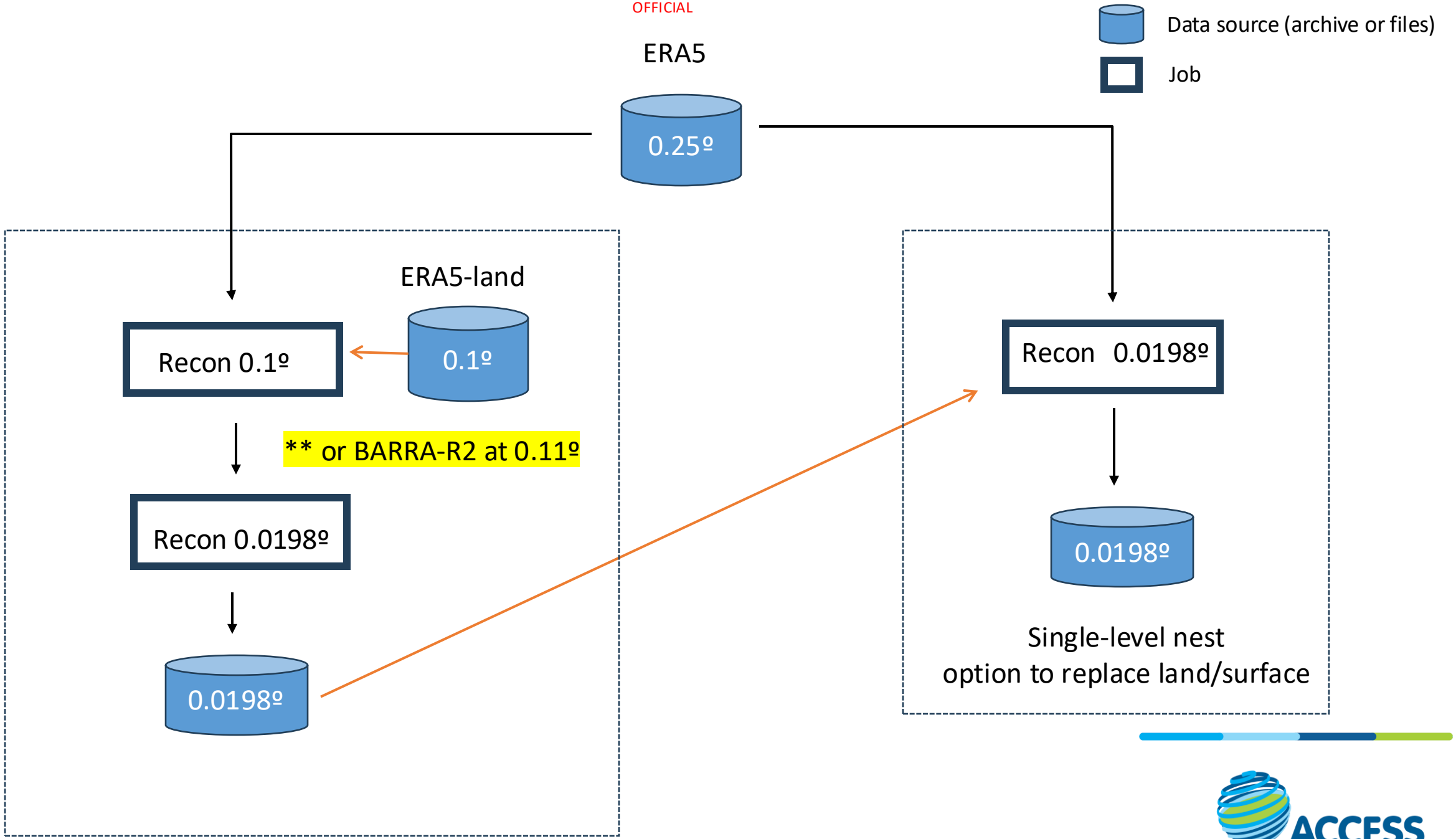
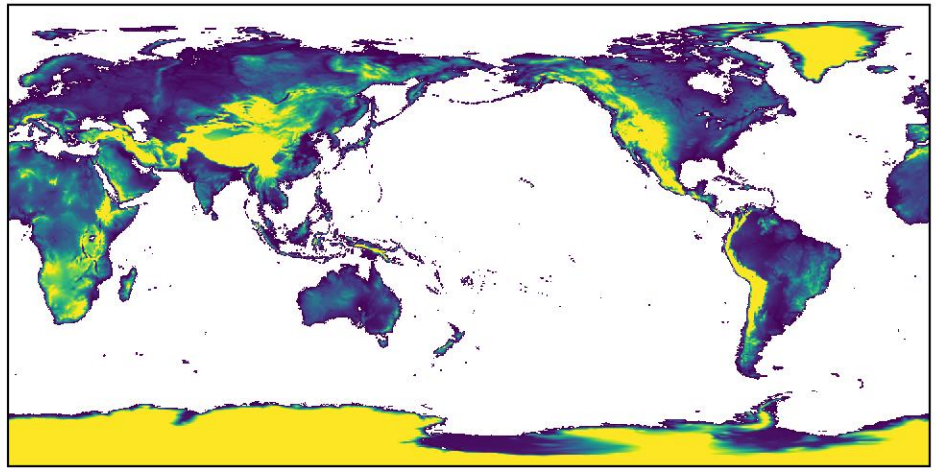

Data source (archive or files)
Job
ERA5
0.25º
ERA5-land
Recon 0.1º
0.1º
** or BARRA-R2 at 0.11º
Recon 0.0198º
0.0198º
Recon 0.0198º
0.0198º
Single-level nest
option to replace land/surface

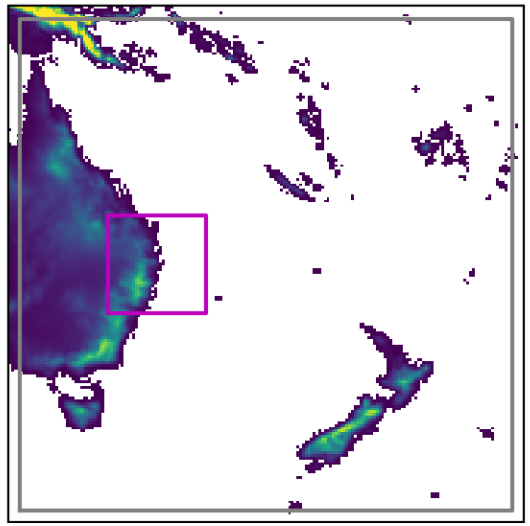
Worked example: ERA5 + higher-res land/surface

Limited Area Domains

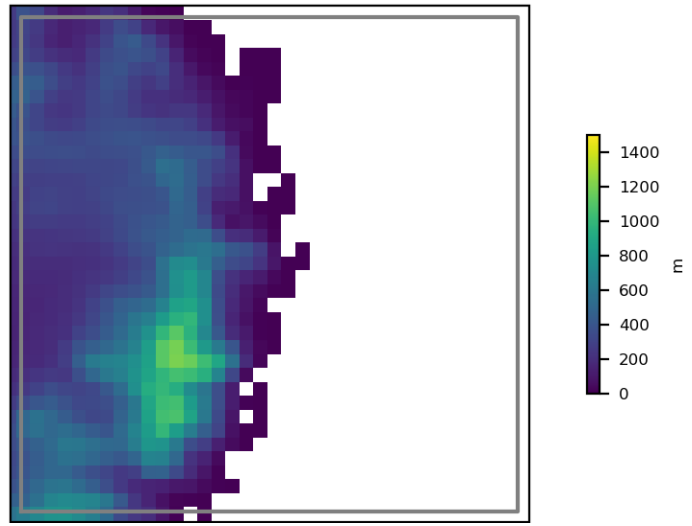
Global ERA5 driving model



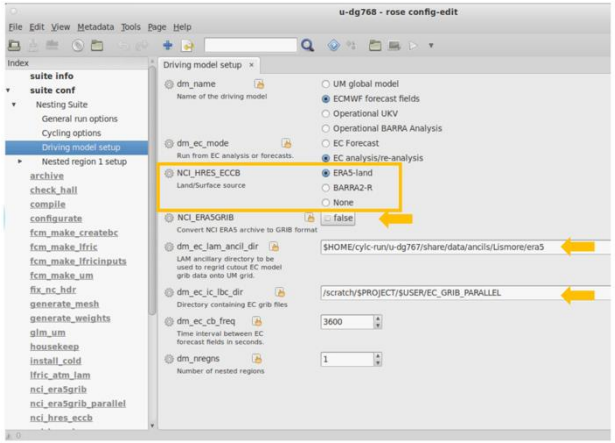
Multi-level nest

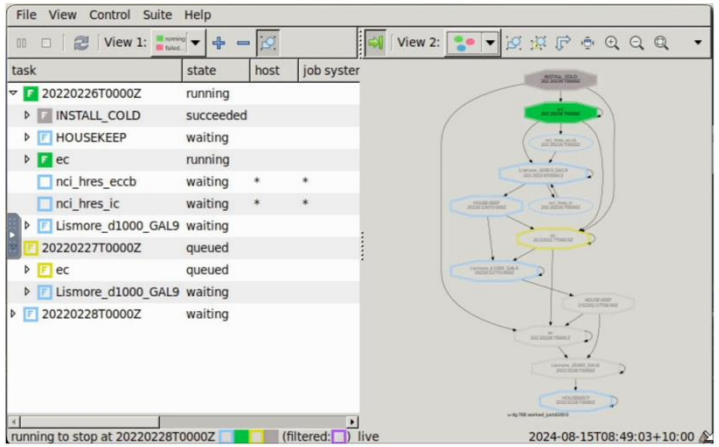


Single-level nest



Added to rose/cylc





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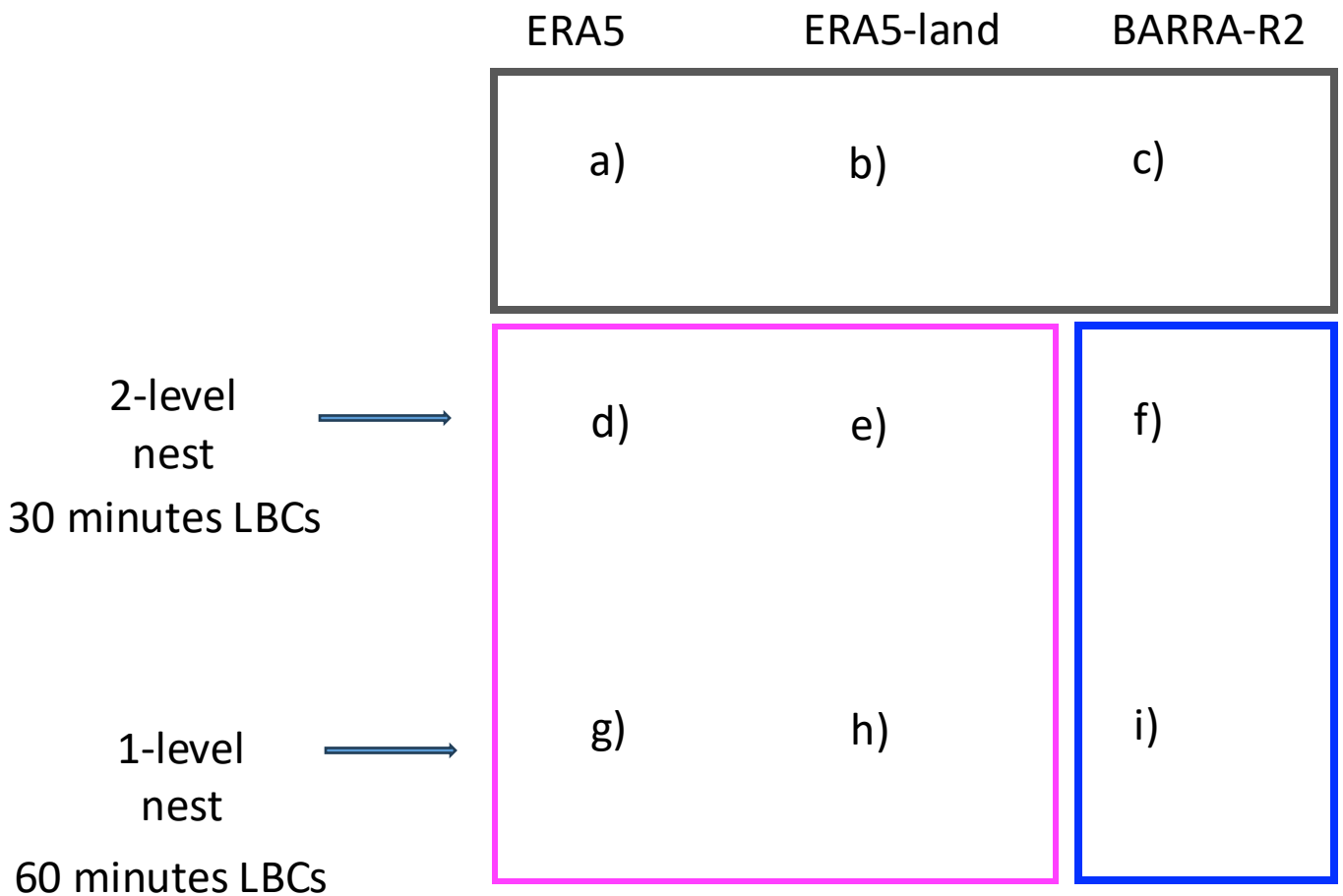
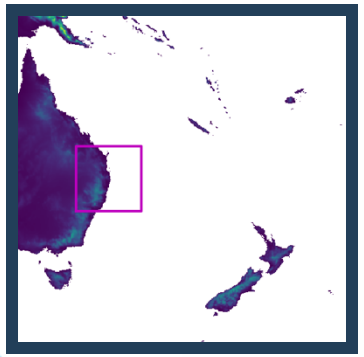
Upcoming plotting orientation:



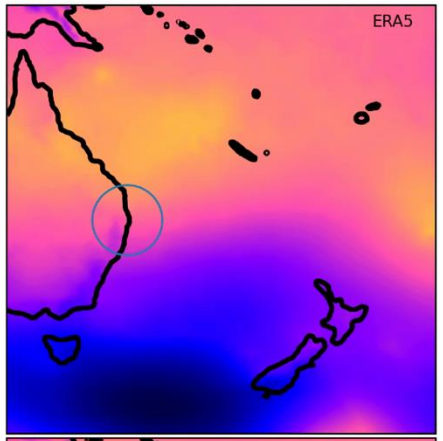
Define the orientation of the upcoming slides.

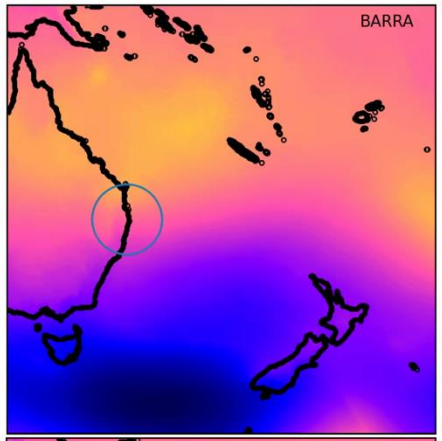
All runs to +72 hours.

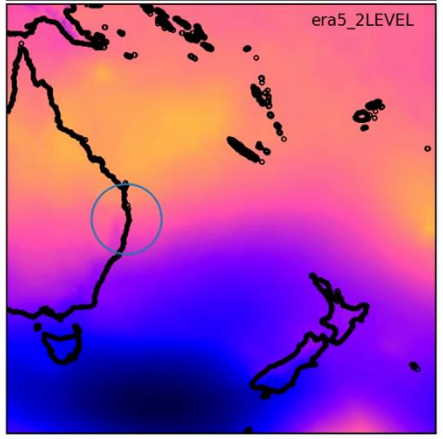


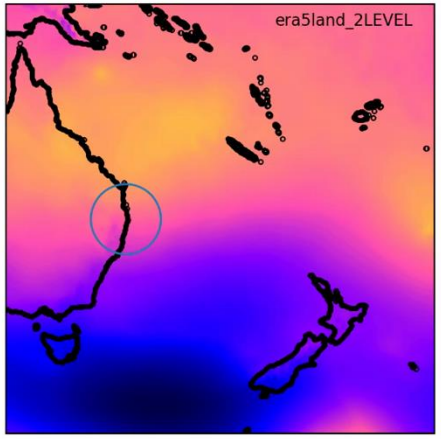
10km nest

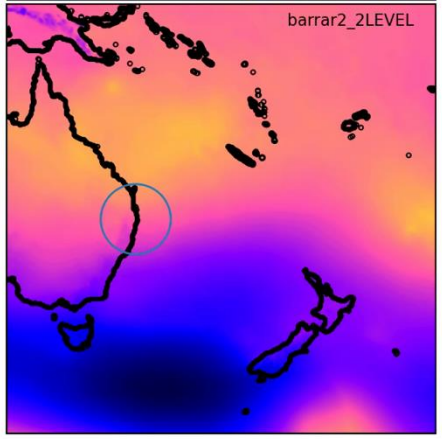
air pressure at sea level [hPa]
20220226T0000

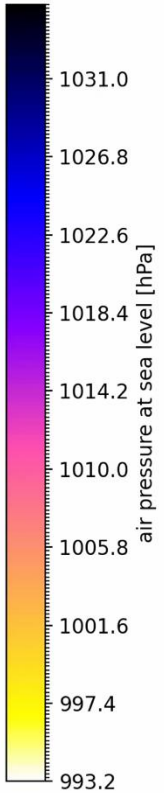


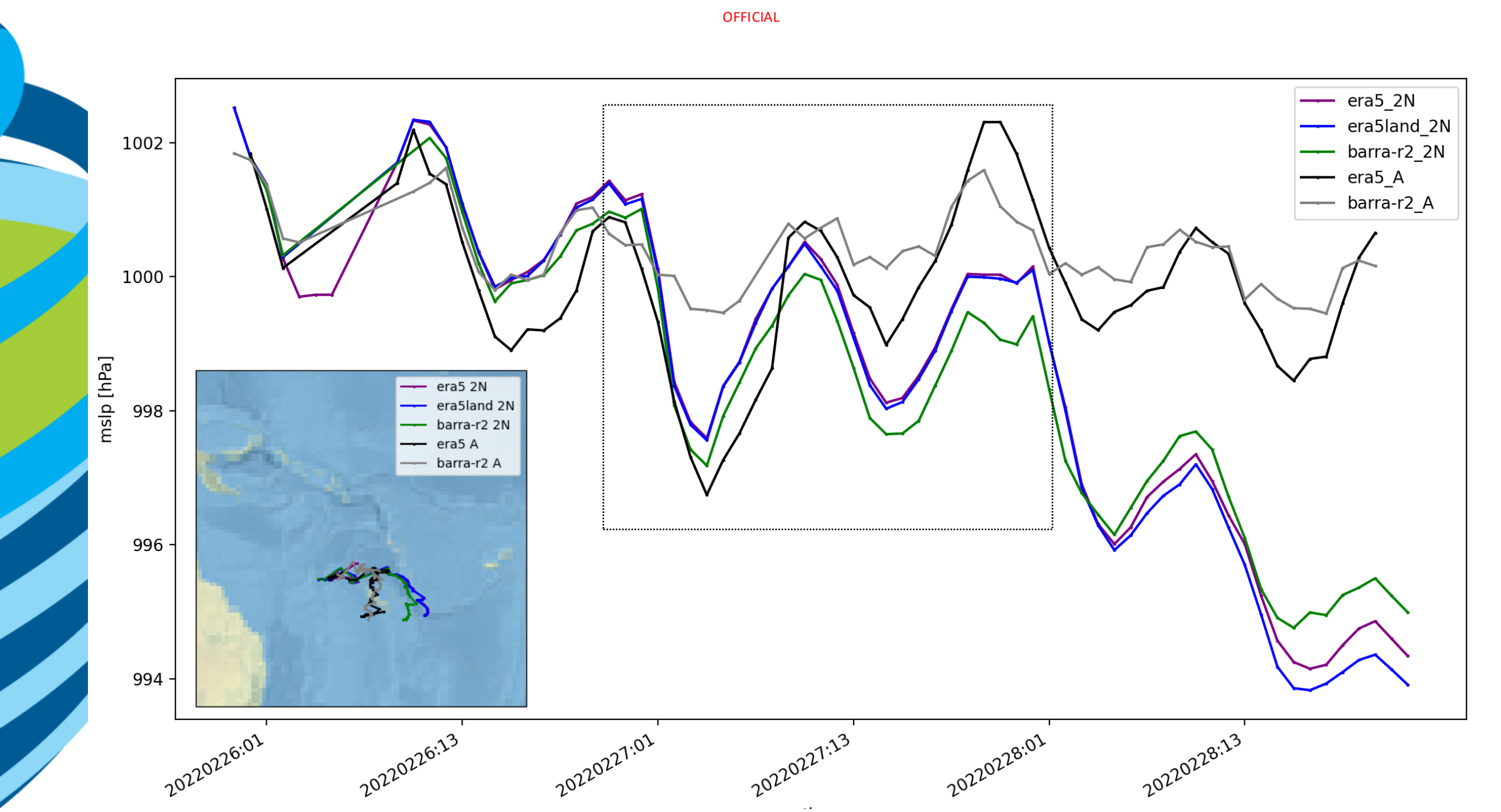




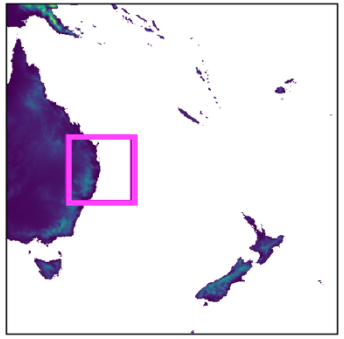




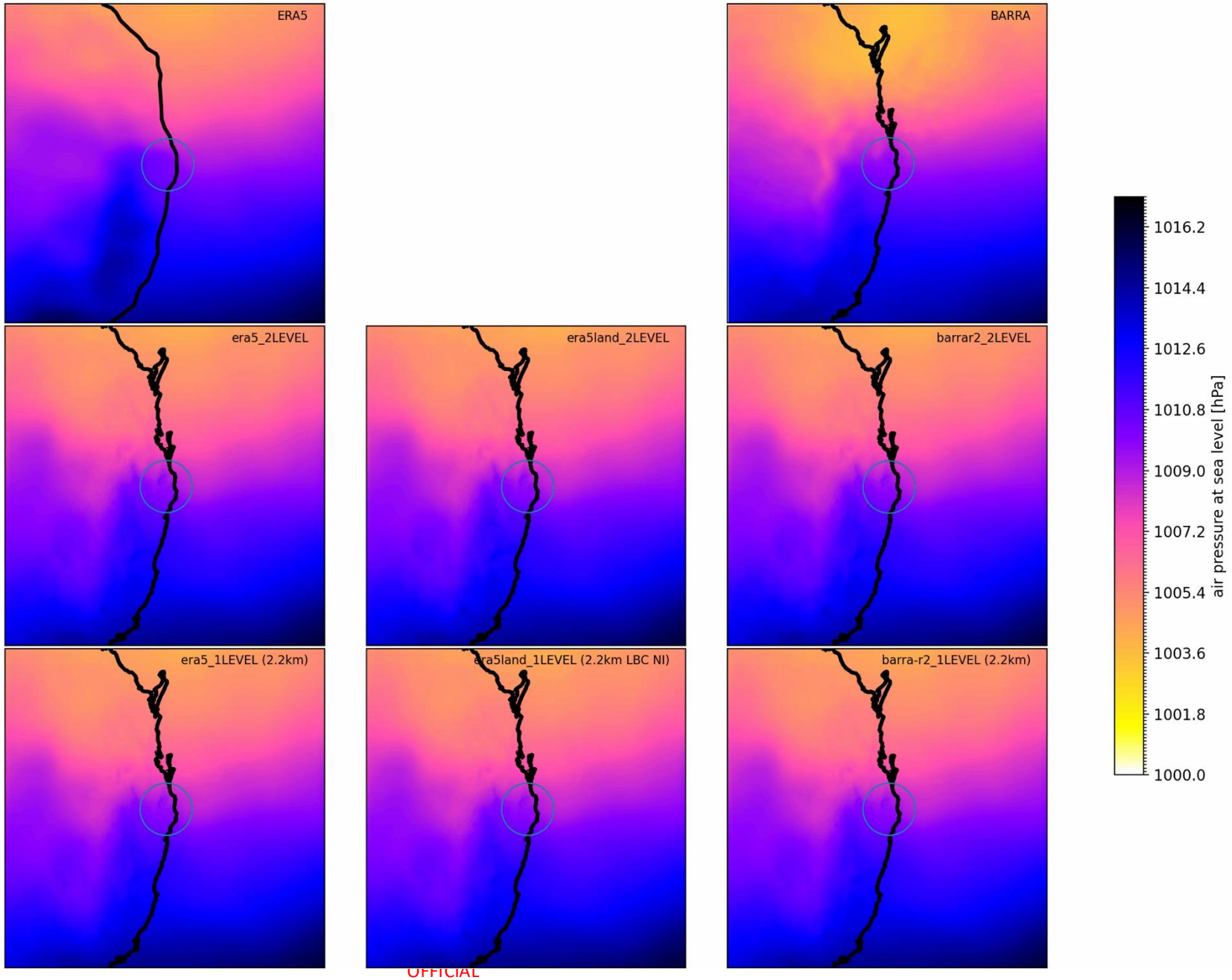


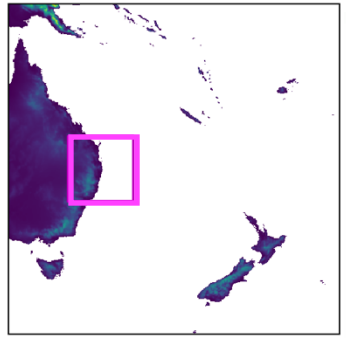

era5_2N
era5land_2N
barra-r2_2N
era5_A
barra-r2_A
era5 2N
era5land 2N
barra-r2 2N
era5 A
barra-r2 A
mslp [hPa]
1002
1000
998
996
994
20220226:01
20220226:13
20220227:01
20220227:13
20220228:01
20220228:13

air pressure at sea level [hPa]
20220226T0005



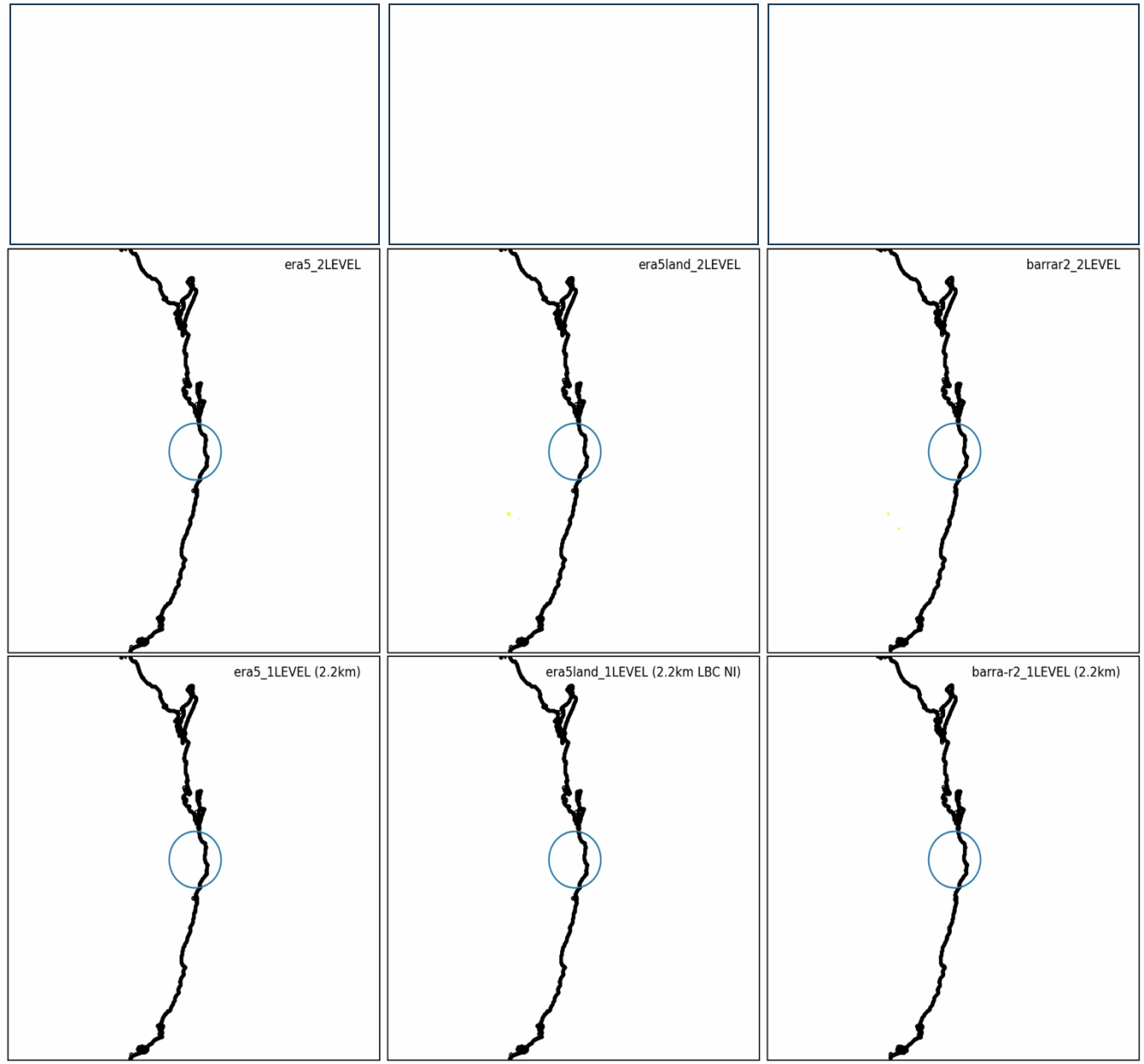
2.2km nest

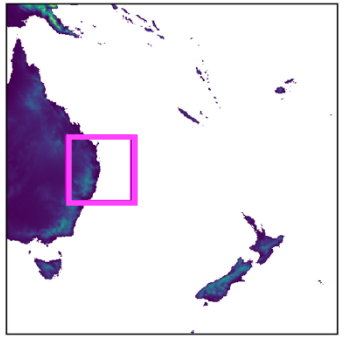




2.2km nest

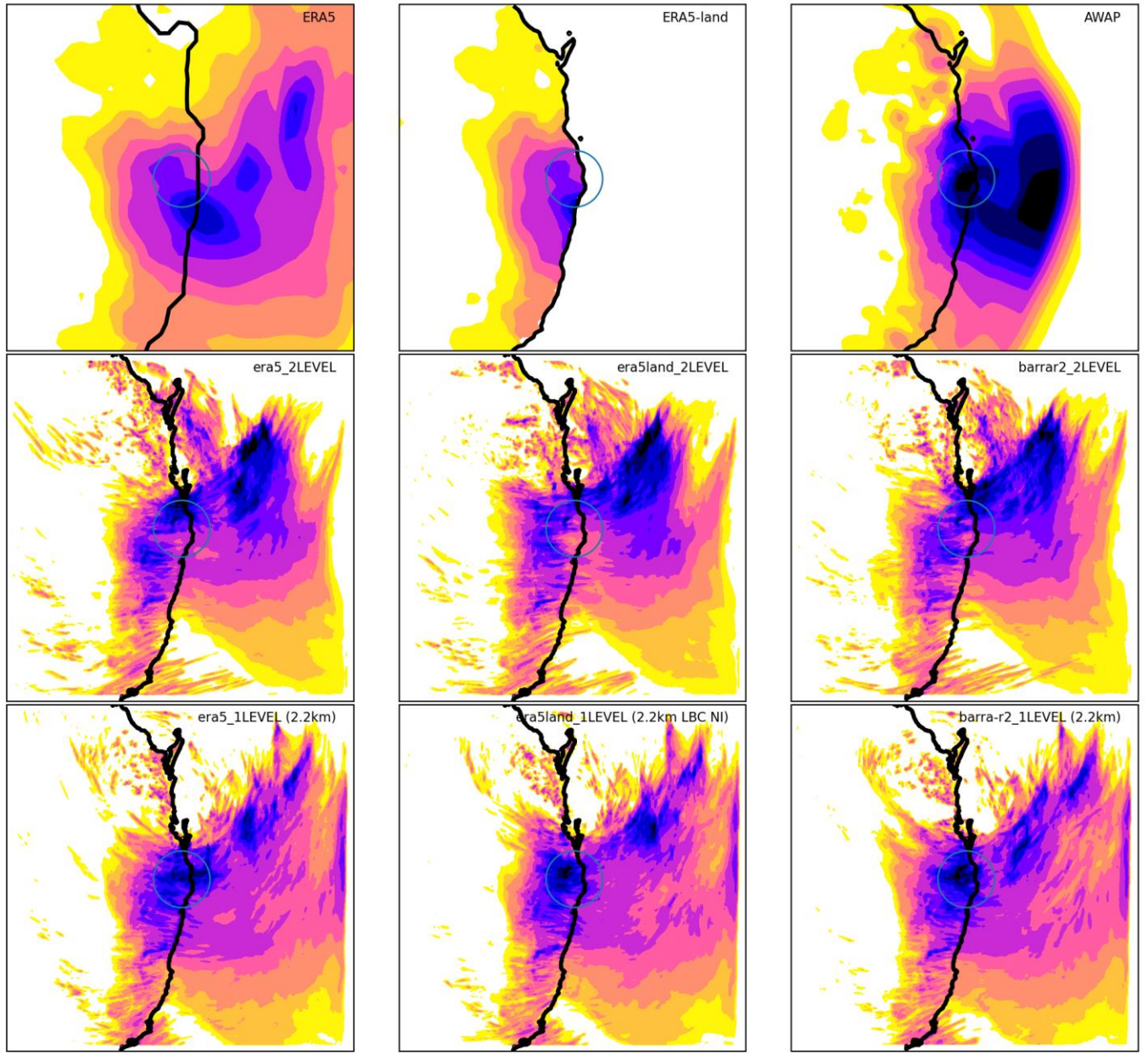
stratiform rainfall [kgm^{-2}]
20220226T0001 to 20220226T0010





2.2km nest

stratiform rainfall [kgm^{-2}]
20220227T0000 to 20220228T0000



Australia's climate simulator