

# The *ML-AusWeather* Project

## Status: Early Prototyping

### The Goal of ML-AusWeather

*A neural earth system model (NESM) which can produce **accurate short-term precipitation estimates** at high resolution for all of Australia*

### People

*Tennessee Leeuwenburg – Regional NESM lead  
Nikeeth Ramanathan – Pipeline and algorithm specialist  
Imtiaz Dharssi – Science lead for variables and evaluation*

### Architectures to explore

*FourCastNeXt – Flow, value model (see Figure 1)  
SFNO / FCNv2 – Fourier model  
GraphCast – Graph neural network  
StormCast – Diffusion network  
We expect other options to emerge and be considered*

### Prototype Configuration:

Barra2 C2 ~4.4km  
Temperature, Wind U, V and Z  
Geopotential, Humidity, Sea level pressure  
Topography, Surface precipitation  
Radar reflectivity, Satellite / Cloud

### EDIT – ML Pipeline Tool

*EDIT – the Environmental Data Intelligence Toolkit*

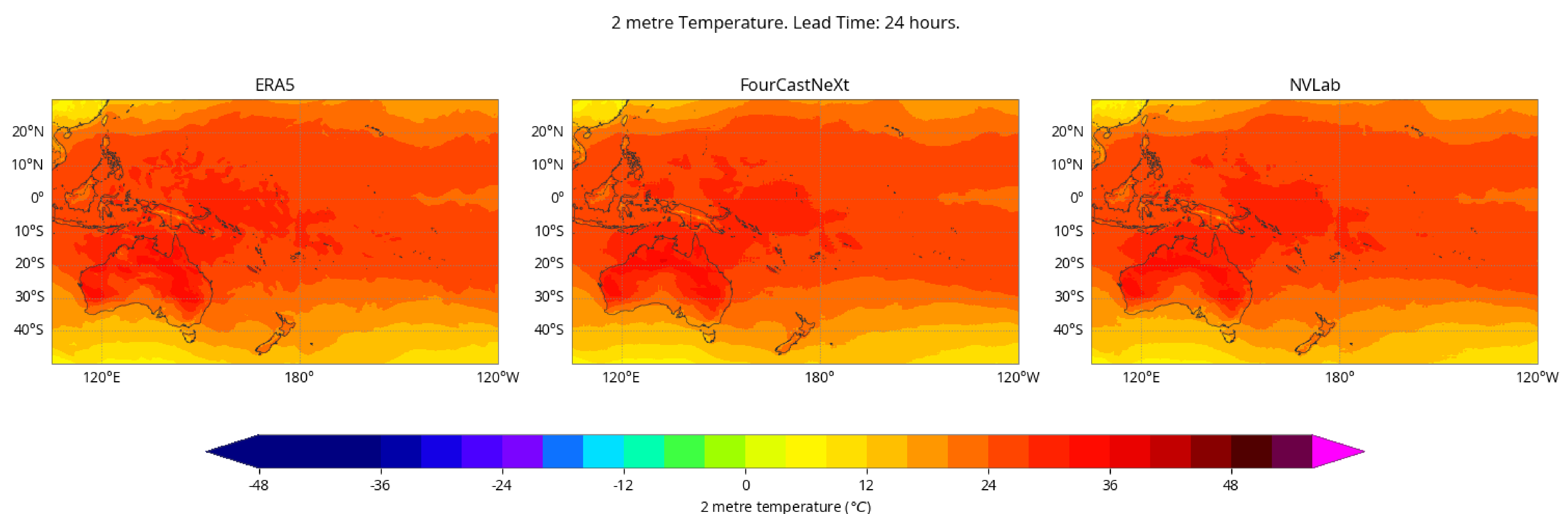
Led by the Bureau of Meteorology with funding support from the Momentum Partnership and collaboration with NIWA and the UKMO

Provides reproducible data processing and training pipelines across HPC environments and institutions  
Working towards a partnership or open source release

### Scores – Verification Tool

<https://scores.readthedocs.io/en/stable/>

scores is a Python package containing mathematical functions for the verification, evaluation and optimisation of forecasts, predictions or models. It supports labelled n-dimensional (multidimensional) data, which is used in many scientific fields and in machine learning. At present, scores primarily supports the geoscience communities; in particular, the meteorological, climatological and oceanographic communities.



**Figure 1:** Illustrative comparison of ERA5, FourCastNeXt and NVLab's FourCastNet, in the Australian region. This shows a lead time of 24 hours, initialized at 2018-01-01T00:00. Created using `earthkit.maps` (ECMWF, 2023).

*Note – Figure 1 is drawn from a global model configuration of the architecture*