

Evaluation Update



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modevaluation.org



Runs model analyses / benchmarks



Manages relationship between data provenance, model repository version, multi-model comparisons and analysis results



Direct pipeline to Fluxnet Shuttle – site updates propagate here

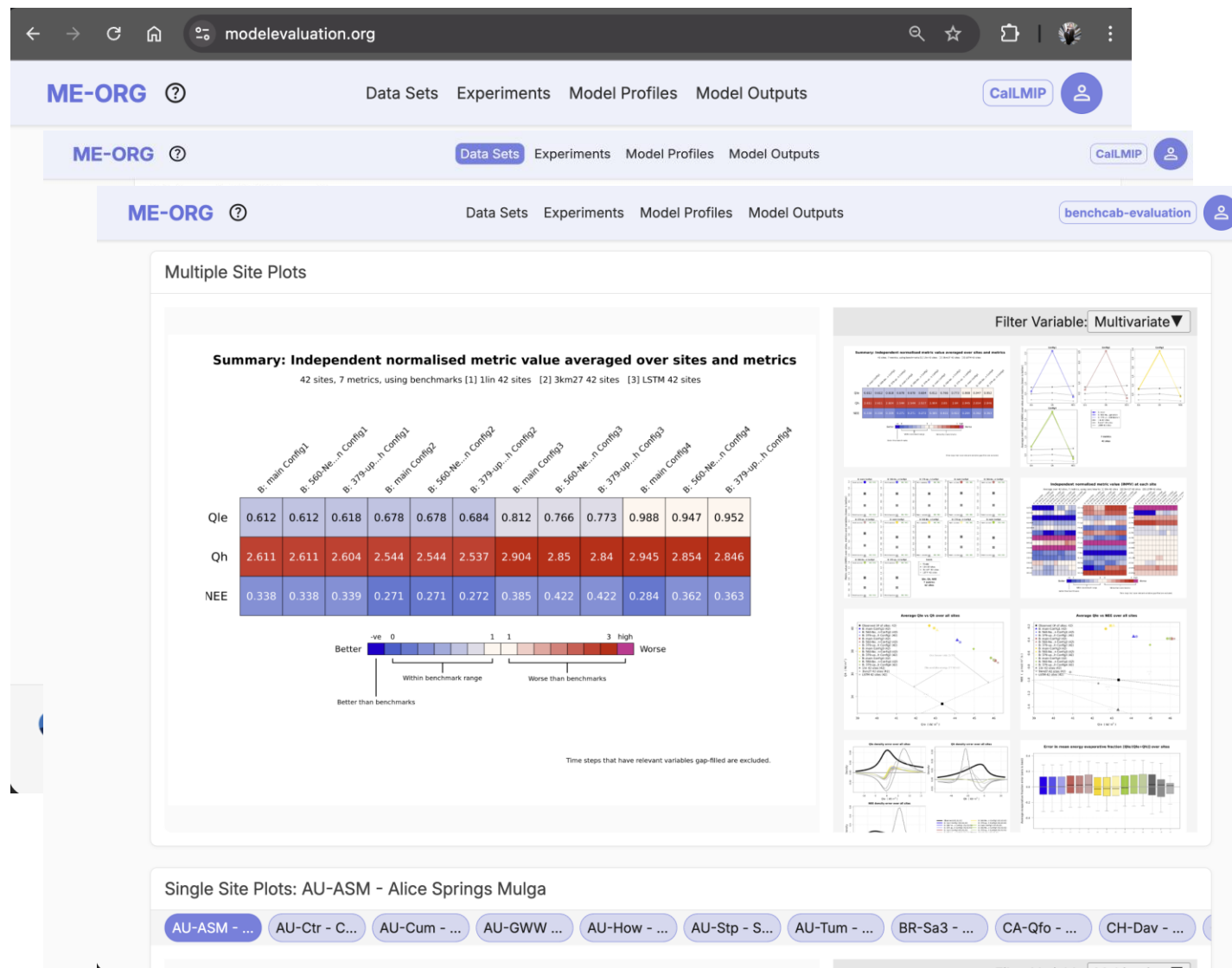


Hosted at Australian supercomputing facility (NCI) with HPC back-end capability; mirroring at other locations possible

Contact:

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- New analysis package with summary overviews, new colour scheme, new fingerprint analyses at single sites.
- Redesigned modevaluation.org website. Hierarchical presentation of analysis figures, added information on figures.

benchcab



benchcab

Build LSM for (up to 3) branches and (up to 6) configurations



Run ALL models for specified site test type

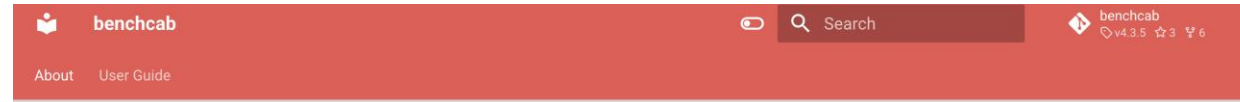


Include all metadata needed for replication in NetCDF global attributes



Push model output bundle via modevaluation.org **API**

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About

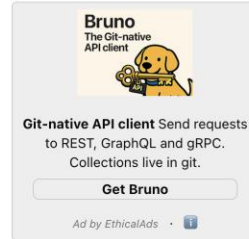
About benchcab

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License

Acknowledgements



benchcab is a testing framework that tests the CABLE land surface model across a range of model configurations and model versions. The tool:

- checks out the model versions specified by the user
- builds the required executables
- runs each model version across N standard science configurations for a variety of meteorological forcings
- performs bitwise comparison checks on model outputs across model versions

The user can then pipe the model outputs into a benchmark analysis via modevaluation.org to assess model performance.

The full documentation is available at benchcab.readthedocs.io.

Supported configurations

benchcab currently tests the following model configurations for CABLE:

- **Flux site simulations (offline)** - running CABLE forced with observed eddy covariance data at a single site
- **Global/regional simulations (offline)** - running CABLE forced with meteorological fields over a region (global or regional)

- API improvements allowing to create model outputs and trigger analyses programmatically.
- Development of **aiida-benchcab** prototype to support **other LSMs and HPCs**. Successfully tested with **SVS**, an advanced land surface scheme developed by Environment and Climate Change Canada (ECCC).
- Collaboration between BoM, Met Office and ACCESS-NRI to implement JULES started.

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modevaluation.org + benchcab



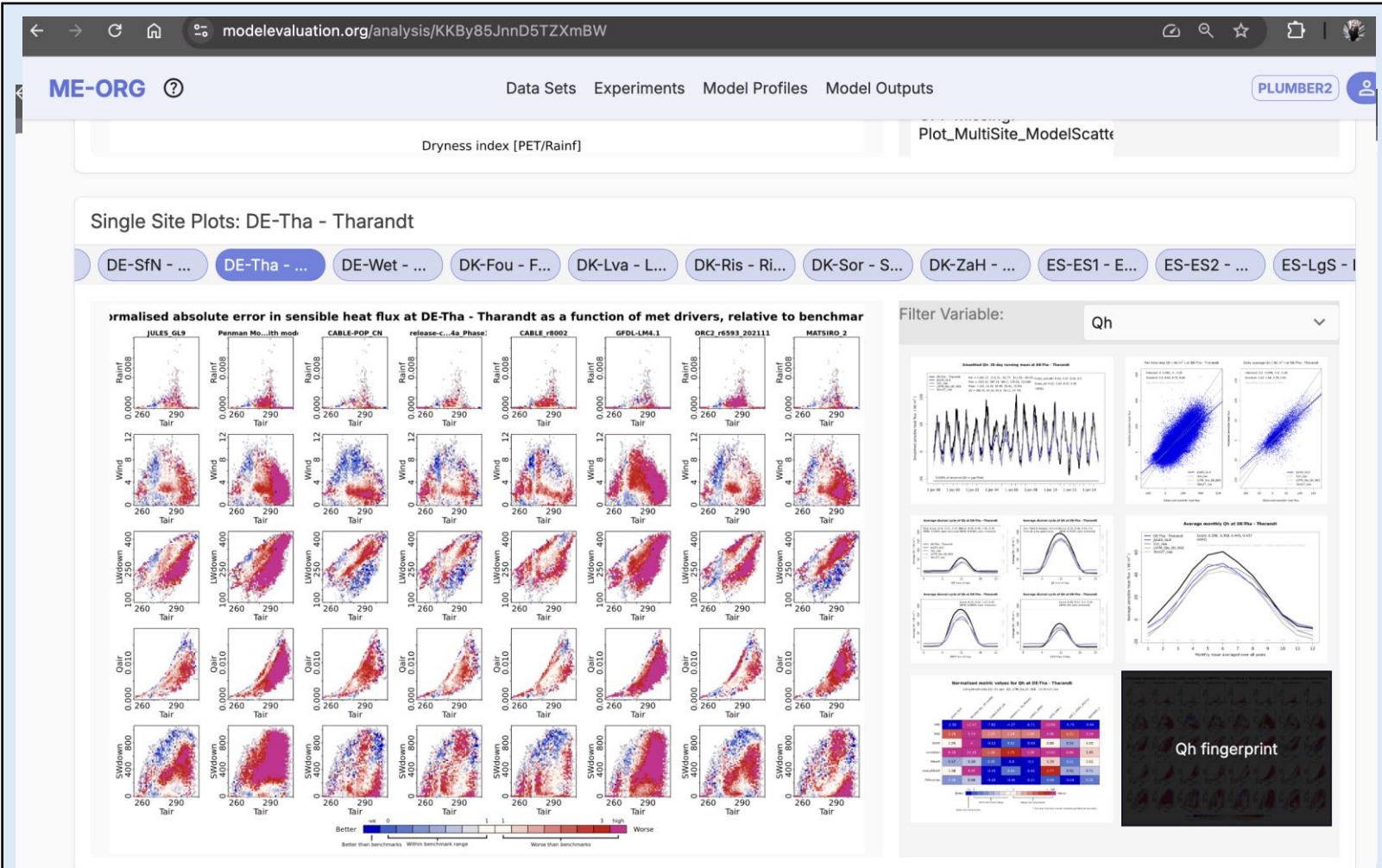
benchcab

Build LSM for (up to 3) branches and (up to 6) configurations

Run ALL models for specified site test type

Include all metadata needed for replication in NetCDF global attributes

Push model output bundle via modevaluation.org **API**



Branches / configurations / sites decoded

HPC used for fast parallel analysis, URL returned



Evaluation framework for hazards and hydroclimate impact

Australia's hydroclimate can respond in non-stationary ways

Observed Millennium (1997-2009) and Tinderbox drought (2017-2019) responses and regime shifts challenged stationary rainfall-runoff assumptions, requiring a more integrated modelling framework for future projections.

HYDROLOGICAL IMPLICATION



E.g. Drying → intense rainfall → altered catchment response

Future water availability and hazards depend on evolving climate, vegetation and land-surface and atmosphere feedbacks.

1 Persistent climate stress from drought

Long-term rainfall deficits alter soil moisture, vegetation and catchment storage.

2 Non-linear runoff response

Declines in runoff can be disproportionate to declines in rainfall.

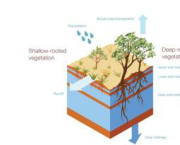
3 Hydrological regime shifts

Some catchments shift towards less perennial flow and may not recover rapidly.

Stationarity can no longer be assumed

AUSTRALIAN BUREAU OF METEOROLOGY: NATIONAL HYDROLOGIC PROJECTIONS2.0

AWRA-L



Water balance
Runoff
Soil moisture



JULES-ES



Water + energy
Vegetation + carbon
Dynamic interactions

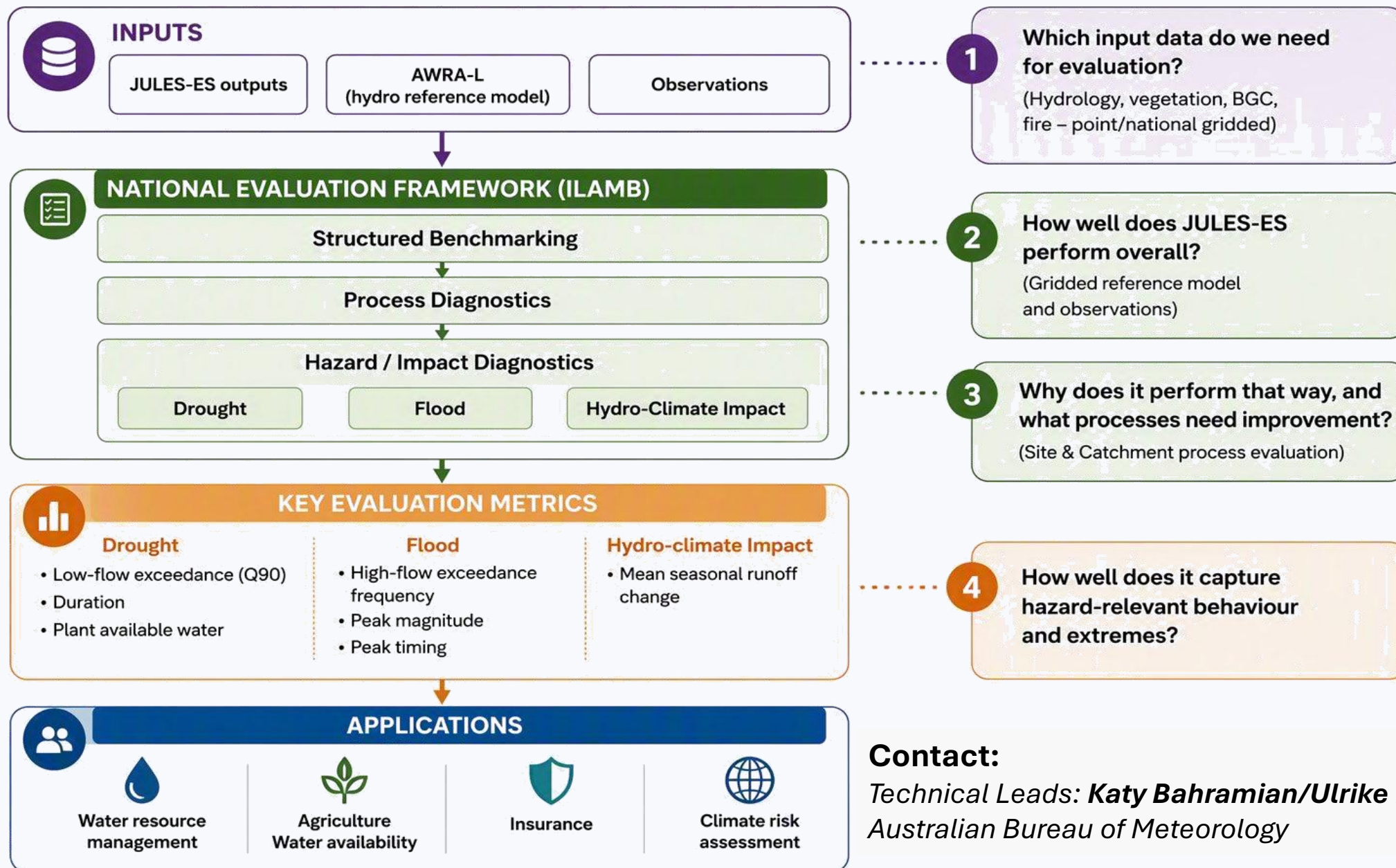
Why JULES-ES for NHP2.0?

- Represents coupled water, energy, vegetation and carbon, biogeochemistry and fire processes
- Allows land-surface states and fluxes to respond dynamically to changing forcing
- Provides a pathway to test and improve Australian process representation

AWRA-L remains a benchmark; JULES-ES enables the capability uplift.



Australian Land Surface Evaluation Framework (ALSEF)



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Thank you!

Reach out for more information and collaboration

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