

# CABLE-2.0

## The Community Atmosphere Biosphere Land Exchange model

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CABLE is a land surface model, simulating the fluxes of momentum, heat, moisture and carbon between the land surface and the atmosphere. The model can operate in a ‘stand-alone’ mode, using prescribed meteorological forcing, or the model can be coupled to an atmospheric model, such as the Australian Climate and Earth System Simulator, ACCESS.

### CABLE-2.0

CABLE-2.0 is the first formal release of the Community Atmosphere Biosphere Land Exchange model since 2008 (v1.4b). CABLE-2.0 supports standalone (single-site to global) applications and ACCESS applications.

The scientific core of CABLE-2.0 is largely the same as earlier versions (Kowalczyk et al., 2006; Wang et al., 2011). Changes from 1.4b include:

- the ability to simulate more than one vegetation type at a given location
- code revision for canopy calculations and screen temperature
- refinement of surface energy and water balance
- partitioning of run-off and glacier capping
- simpler albedo calculation

CABLE-2.0 is very similar to the version of CABLE used for the ACCESS1.3 CMIP5 submission (Kowalczyk et al., 2013).

### Benchmarking

Benchmarking simulations have been performed with CABLE-2.0 for

- a selection of flux tower locations,
- a global stand-alone simulation using GSWP2 meteorological data
- an ACCESS atmosphere-only simulation from 1978-1997

(See <https://trac.nci.org.au/trac/cable/wiki/CableBenchmarking>)

Single-site simulations were run using datasets prepared by the Protocol for Analysis of Land Surface models (PALS) and CABLE output has been submitted to the PALS website ([www.pals.unsw.edu.au](http://www.pals.unsw.edu.au)) for analysis and plotting. Examples are shown in Figure 1. Compared to v1.4b, this release has improved energy and water conservation and gives better net radiation simulations at most sites.

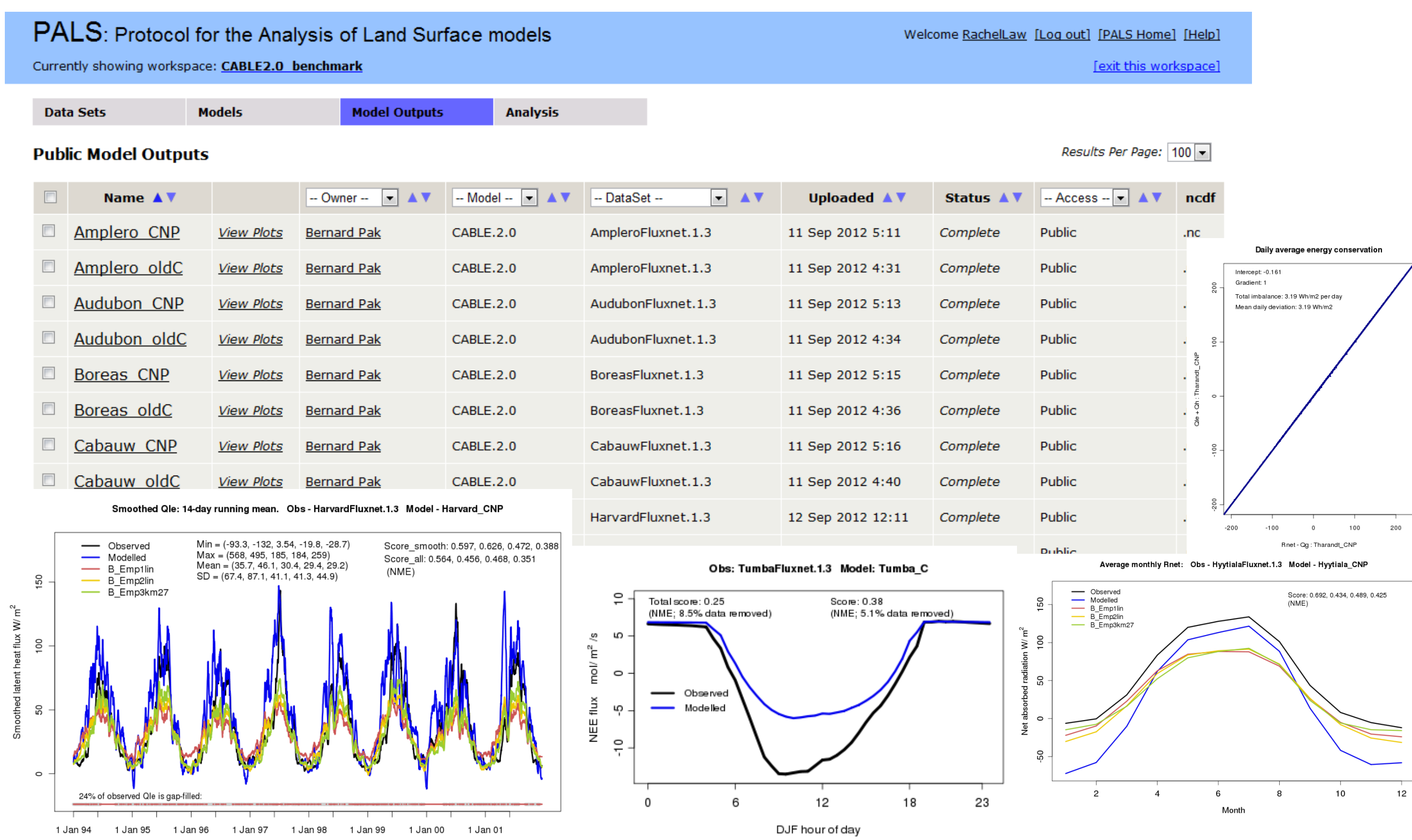


Figure 1: Screen grab of model output listing of CABLE2.0\_benchmark workspace on PALS ([www.pals.unsw.edu.au](http://www.pals.unsw.edu.au)) and examples of some of the figures and summary statistics available through the PALS website (energy conservation, timeseries, diurnal cycle and annual cycle shown here).

### Distribution

CABLE-2.0 is distributed through a Subversion repository, hosted at the National Computational Infrastructure National Facility. This allows CABLE development to be shared across the CABLE community. Improvements to the CABLE code must go through a testing and approval process before being included in the CABLE ‘trunk’.

### The CABLE community

CABLE has a growing user/developer community both in Australia (at CSIRO, the Bureau of Meteorology, 11 universities and two other institutions) and overseas (18 institutions including 5 in China).

Find out more about CABLE and the CABLE community through

- the CABLE email list: <https://lists.csiro.au/mailman/listinfo/cable-users>
- the CABLE wiki: <https://trac.nci.org.au/trac/cable/wiki>
- the CABLE Roadmap: [http://www.cawcr.gov.au/publications/technicalreports/CTR\\_057.pdf](http://www.cawcr.gov.au/publications/technicalreports/CTR_057.pdf)

CABLE-2.0 is free to use for research and development through a licence agreement with CSIRO as the custodian organisation. For registration instructions see <http://www.cawcr.gov.au/projects/access/cable/index.php>

ACCESS was run with CABLE-2.0 in an atmosphere-only configuration to compare with the equivalent ACCESS1.3 simulation performed for CMIP5. An additional simulation used recalibrated leaf optical properties to improve the simulation of surface albedo compared to ACCESS1.3.

ACCESS with CABLE-2.0 performs similarly to ACCESS1.3 (as expected). Screen temperature biases (Figure 2) are slightly reduced for June-August over northern hemisphere continents, and further reduced when the recalibrated optical properties are used.

An ACCESS coupled model simulation is in progress.

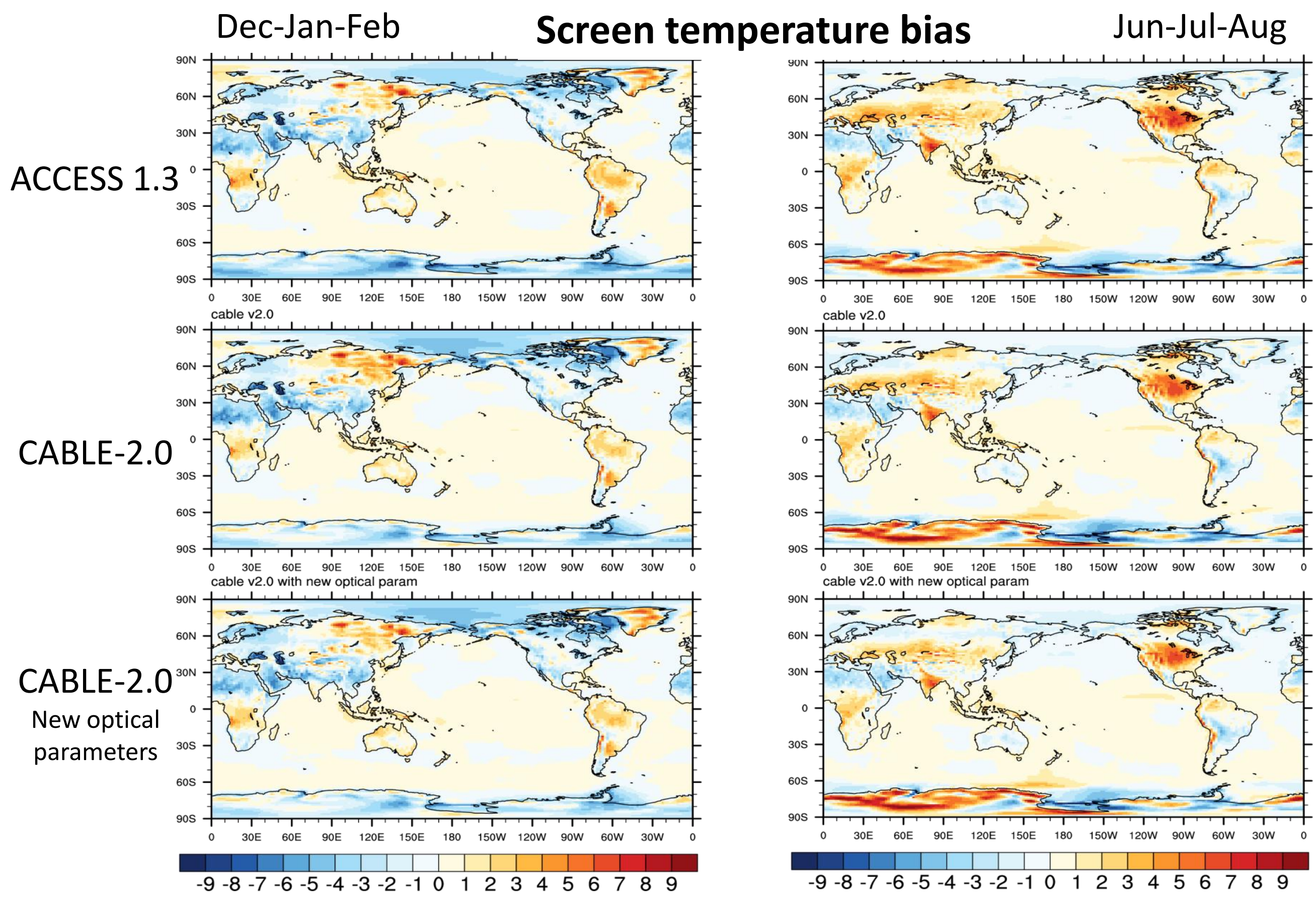


Figure 2: Screen level temperature bias (modelled minus ERA-Interim) for Dec-Feb (left) and Jun-Aug (right) for ACCESS1.3 (top), ACCESS with CABLE-2.0 (middle) and ACCESS with CABLE-2.0 and recalibrated optical properties (bottom).

### References

Kowalczyk, E. A. et al. (2006). The CSIRO Atmosphere Biosphere Land Exchange (CABLE) model for use in climate models and as an offline model. CSIRO Marine and Atmospheric Research Paper 013, 43 p.

Kowalczyk, E. A. et al. (2013). The land surface model component of ACCESS: description and impact on the simulated surface climatology, Aust. Meteor. Oceanog. J. (submitted).

Wang, Y.P., et al. (2011). Diagnosing errors in a land surface model (CABLE) in the time and frequency domains. J. Geophys. Res.-Biogeosciences, 116.

#### FOR FURTHER INFORMATION

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#### ACKNOWLEDGEMENTS

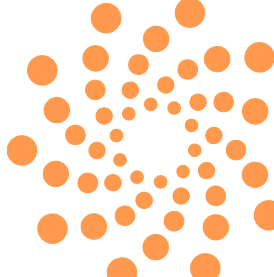
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