CABLE module update

2021 JULES science meeting

Australia's National Science Agency

NCI

clex

ACCESS, JULES and CABLE

CABLE – Australian community LSM that includes unique representations for many terrestrial processes (e.g. canopy radiation, roughness, carbon-nitrogen-phosphorous cycles)

Australian participation in CMIP5:

- CSIRO-Mk3.6 - includes CABLE
- ACCESS1.0 – UM7.3 (HadGEM2r1.1) + MOSES2.2 + MOM4.1 + CICE4.1 + OASIS
- ACCESS1.3 – UM7.3 (~GA1) + MOSES2.2 + CABLE1.8 + MOM4.1 + CICE4.1 + OASIS

Australian participation in CMIP6:

- ACCESS-ESM1.5 – UM7.3 (~GA1) + MOSES2.2 + CABLE2.4 + CASACNP + MOM5 + WOMBAT + CICE4.1 + OASIS
- ACCESS-CM2 – UM10.6 (GA7.1 incl UKCA) + JULES (GL7) + CABLE2.5 + MOM5 + CICE5.1.2 + OASIS

JAC: Aims to formalise the interface and coupling between CABLE and JULES/UM

- reduce time/resources needed to update ACCESS to latest generation of atmospheric model
- enable closer collaborations between UK and Australian land surface science communities (e.g. benchmarking)
- enable faster pull through of science from stand-alone development into ACCESS

CABLE used in a number of applications – stand-alone configurations (PLUMBER, TRENDY, RECCAP, LiS etc.), regional climate (CCAM, WRF), as well as global climate and global Earth system (in ACCESS, the Australian Community Climate and Earth System Simulation). CABLE doesn't engage with the NWP, hydrological forecasting or seasonal prediction applications of ACCESS (the Australian Bureau of Meteorology uses JULES).

JAC, JULES and CABLE, is partnership project between CSIRO, UNSW (the Australian university sector more broadly) and the UKMO that aims to formalise the interface between CABLE and JULES.

We thank UKMO staff, particularly Martin Best, Richard Gilham and Maggie Hendry, for their assistance towards the ultimate aim of JAC.
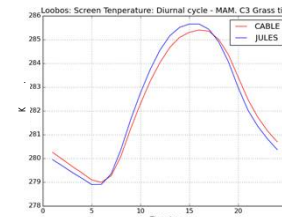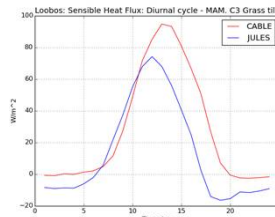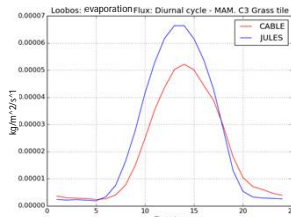
Towards JAC

- *HAC branches – JULES6.1 + CABLE3* ⎤ 1 switch (lsm_id) acting at surf_couple layer (in since JULES 5.1)
⇒JAC – JULES? + CABLE3 + CASACNP ⎦ single site, stand alone, biophysics-only capability initially

HAC at v5.7

2020/21 progress: consolidating CABLE (in house activity), implementing CABLE variables, inputs and namelists (and keeping up with JULES updates while retaining in-house capability) … the addition of science code imminent (v6.4?) accompanied by (new) rose-stem tests

Unknowns: ACCESS-NRI, NGMS/LFRic timelines and technical requirements
coding standards and documentation

Aim is to establish a clean, single switch – not work module by module, process by process – at least in the first instance. We are starting small (single site, biophysics only) but always with an eye to fully coupled (global) land-atmosphere capability.

Have two JAC sub-activities ongoing: First the HAC developmental branch on the UK repository which aims to update alongside JULES – we use this as test bed for formal Tickets to JULES. Second is CABLE3 – a merge of the existing CABLE variants in the community into a consolidated code base.

In 2020/21 progress has been made, if somewhat slowly. This has largely been towards building the skeleton (variables, inputs, namelists) needed. We are hopeful that actual science will be implemented in the next 1 or 2 release cycles. Note that once science code is implemented, additional rose-stem tests will be needed to protect those developments – discussions with the UKMO & JULES community will occur to make sure that these are balanced.

Unknowns: NGMS – what does this imply, and when is this going to happen?
ACCESS-NRI* – a new institution which we hope to be able to tap into
general problem of standards and documentation
the JULES release cycle timing
checking if changes impact our current capability (including non-JULES).

ACCESS-NRI stands for the National Research Infrastructure for the ACCESS model.

References:
Wang and Leuning (1998) Ag Forest Meteorol 91:89-111
Wang et al. (2010) Biogeosciences 7:2261-2282
Kowalczyk et al. (2013) Aust Meteorol Ocean J 63:65-82
Law et al. (2017) Geosci Mod Dev 10:2567-2590
Ziehn et al. (2019) JSHESS 70:193-214

CABLE web pages at https://trac.nci.org.au/trac/cable/wiki

Thank you and any questions?

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