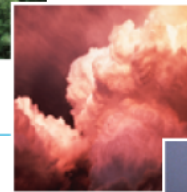# Australian CMIP6 model plans

www.cawcr.gov.au

Tony Hirst
Earth System Modelling Program, CAWCR
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Australian Government
Bureau of Meteorology

The Centre for Australian Weather and Climate Research
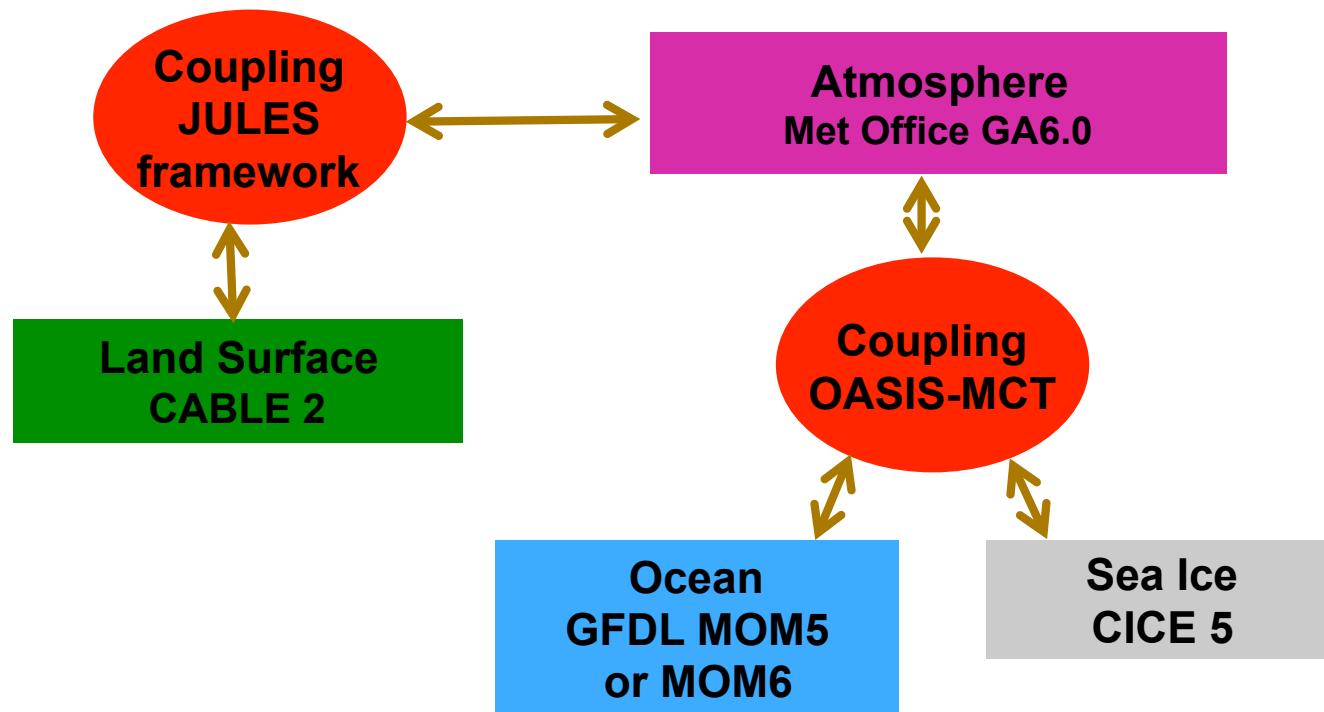A partnership between CSIRO and the Bureau of Meteorology

CSIRO

Outline

- Coupled modelling plans for CMIP6

- Points from CMIP5 survey

- Comments on CMIP6

ACCESS-CM2
AOGCM for CMIP6

Coupling
JULES
framework

Atmosphere
Met Office GA6.0

Land Surface
CABLE 2

Coupling
OASIS-MCT

Ocean
GFDL MOM5
or MOM6

Sea Ice
CICE 5

CSIRO and BoM through CAWCR

Centre of Excellence for Climate System Science

**Prototype
Current status**

**Coupling
JULES
framework** ⟷ **Atmosphere**
Met Office ~ GA1.0 ← Awaiting release
of GA6.0

**Land Surface
CABLE 2**

**Coupling
OASIS-MCT**

**Ocean
GFDL MOM4p1**

**Sea Ice
CICE 4** ← CICE5 release –
being implemented

Awaiting timing of
of MOM6 release
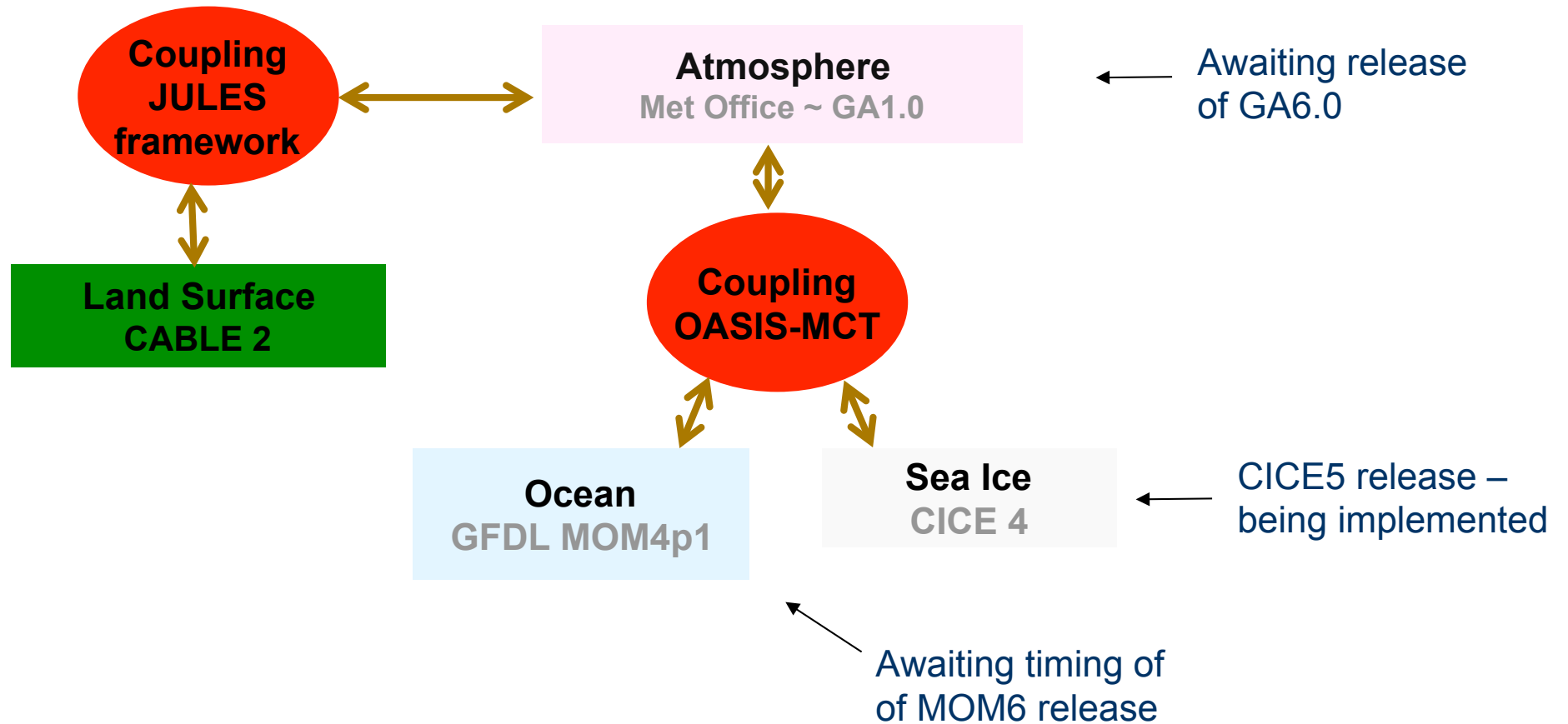
ACCESS-CM2
Resolution – current plan
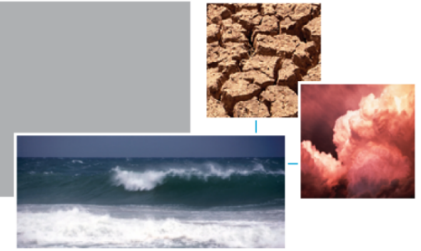
Low resolution configuration

- Atmospheric resolution – N96 (~1.2°lat; ~1.8°lon); 85 levels
    - CMIP5 version – N96; 38 levels

- Oceanic resolution – compare ~1 deg., 0.25 deg. horizontal resolution
    - Initial configuration will have the ~1deg. – same as CMIP5 version

High resolution configuration – subsequent

- Atmospheric resolution – N216 (~0.55°lat; ~1.8°lon), 85 levels

- Oceanic resolution – 0.25 deg. horizontal

- Subject to adequate computation, and scalability

ACCESS-CM2/ESM2

Plan – ACCESS-ESM2

- Carbon cycle coupled to N96 version of ACCESS-CM2
    - CASA-CNP terrestrial biogeochemistry
    - Matear CSIRO ocean biogeochemistry
- Include atmospheric chemistry (UKCA) when ready

Potential CMIP6 submissions - current view

- ACCESS-ESM2 (at N96)
    - Perform extensive set ~2016/17/18
- ACCESS-CM2-hr (at N216)
    - Perform limited set ~2017/18

CMIP5 survey

- ## CMIP5 experimental design

  - Multi-tier approach was very useful in prioritisation

  - RCP2.6 very widely used – low end as "core"

  - Idealised experiments extremely useful
    - 4xCO2 – extend for several centuries as Tier 1?
    - sstClim-style experiments to understand radiative forcings of individual changes

- ## Forcings historical/RCPs

  - Specification is required for historical extension, to benefit detection/ attribution studies. For CMIP6, an extension protocol should be defined through 2020 at least.

  - Aerosol future spread not well sampled in scenarios.

  - Some additional specification required, e.g., level of background stratospheric volcanic aerosol in piControl

CMIP5 survey

- ## Standard output

    - Prioritisation of atmospheric variables would be helpful. Suggest survey the usage of fields in CMIP5.

    - Suggest save monthly mean 3-D fields of moisture transport uq and vq.

- ## Data volume

    - Concern about volume of data for CMIP6. Systems are only recently working adequately for CMIP5 volume.

Further comments regarding CMIP6

- ## Experimental design

  - Concept of limited "CMIP characterisation" set is broadly endorsed

  - Focus on WCRP Grand Challenges is supported, but matching to some of the Grand Challenges (e.g., Extremes) is not yet clear.

- ## Forcings historical/RCPs

  - High- and low-end scenarios in characterisation set is supported. Encourage more ensemble members in preference to more scenarios.

  - The characterisation scenarios should be robust, to likely "stand the test of time" so as to be meaningful over multiple development cycles.
    - RCP8.5 could do as high end
    - Low end needs revision from current RCP2.6?

  - Additional scenarios, e.g., a mid-range scenario and a scenario with different aerosol management assumptions, are useful but can lie in a separate 'scenarios' sub-project.

Further comments regarding CMIP6

- **Science**

    - Simulations that explore systematic errors in simulating climate "drivers" in more detail (monsoon, blocking, hemispheric modes, ENSO, etc.) would have support.

    - Experimentation to systematically explore variation of climate sensitivity between model versions would have support. Parameter perturbation experimentation?

- **Evaluation**

    - International approach to basic model evaluation would be helpful.

Further comments regarding CMIP6

- More information on the models would benefit (user views)

  - More information on model "family tree" would be useful – differences and similarities between model components in different models and versions.

  - More information on model tuning would be useful – do not want to have to second guess what the modellers may have tuned for.

- Australian CMIP user community would like to be a part of the discussion on CMIP6 planning

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