Wrap-up

• CESM2.0/CAM6 released
  • B1850, BHIST, FHIST(AMIP) scientifically-supported compsets included. Only with FV 1 degree
  • Simple model compsets

• CESM2.1 to be released later this summer
  • No scientific changes, i.e., no tuning of existing compsets
  • More compsets - including 2 degree configurations, CAM-SE

• Documentation and users guide under construction
Discussion topics

• Diagnosing CESM2
  • Climate sensitivity, AIE, CMIP5 vs CMIP6
  • F-case runs (AMIP) with various features on/off, e.g.:
    • CLUBB
    • WACCM-SC vs CAM (high-top vs low-top)
  • Other experiments: *Your input requested*

• Vertical resolution

• Near-Future development
  • Spectral element dycore
  • Regional refinement
  • Initialized configurations (e.g. CAPT), Nudging, Data Assimilation
Discussion topics

• Physics
  • LW scattering
  • Coupling – “physics grid”, sub-stepping, implicit approaches

• Remaining biases
  • Double ITCZ (better but not gone)
  • Orographic biases
  • US Midwest and other MCS dominated regimes
  • Southern ocean biases

• Software engineering/quality control
Gregory plots from abrupt 4xCO2 simulations

Release version of CESM2 (297) has higher climate sensitivity than CESM1 and than development version 125.

Note: 125 has CLUBB and MG2. Origin of higher sensitivity is not clear, nor is possible connection to 20th C warming.
Vertical Resolution Summary

• Vertical resolution & model top are critical issues to address in development of CESM3

• **Pressing Questions:** what resolution/model top is needed for the science we want to do? How many configurations are needed and can be sustained?
  • Scientifically supported compsets vs. more tools for users

• Send input to Yaga Richter (jrichter@ucar.edu) & Brian Medeiros
  (brianpm@ucar.edu)
Boundary Layer (very bottom):

L33: Standard L32 grid with one extra level at ~8m.
2-year aquaplanet test with CAM6 by Brain M

Split-ITCZ merges to single ITCZ.
Rain changes from dominated by convection to dominated by large-scale.
(Likely due to triggering of deep convection scheme)
CESM3

Climate Studies:
- Lots of years
- Fast model

Initialized Prediction:
- Get Variability Right!
- Stratosphere
- More difficult if lid exceeds available obs

CAM7
WACCM7

Middle/upper atmospheric dynamics/chemistry:
- Good stratosphere
- High model top
- Good QBO=high vertical resolution
Seasonal Prediction:

More ensembles = more skill

Higher top – so far, similar skill