Year in review, plans for next year(s)

CESM Paleoclimate Working Group

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NCAR/CGD/PPC/Paleo

CESM Paleoclimate Working Group
Meeting, Boulder, June 18, 2019
Release of iCESM1.2

- Github
- JAMES paper (accepted)
- iLME to Climate Data Gateway
- iLME paper
- Building a suite of simulations
- iCESM2
Release of iCESM1.2

- Github
- JAMES paper (accepted)
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- iCESM2

The connected isotopic water cycle in the Community Earth System Model version 1

Release of iCESM1.2

https://www.earthsystemgrid.org/dataset/ucar.cgd.cesm4.CESM_CAM5_LME.html

- Github
- JAMES paper (accepted)
- iLME to Climate Data Gateway
- iLME paper
- Building a suite of simulations
- iCESM2

Volcanic eruption signatures in the isotope-enabled Last Millennium Ensemble


*Paleoceanography and Paleoclimatology* (submitted)
Release of iCESM1.2

- Github
- JAMES paper (accepted)
- iLME to Climate Data Gateway
- iLME paper
- Building a suite of simulations
  - Preindustrial
  - Last Millennium
  - Mid-Holocene
  - Deglaciation
  - LGM
  - EECO
  - Late Paleozoic

From Chengfei He
Release of iCESM1.2

- Github
- JAMES paper (accepted)
- iLME to Climate Data Gateway
- iLME paper
- Building a suite of simulations
- iCESM2 release
CESM2 @ FV2x1

- CESM2.1.1 release (6/10/19)
  - B1850f19g17, BWma1850f19g17
  - BHISTf19g17, BWmaHISTf19g17

- Timing/costs

<table>
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<th>Total PEs</th>
<th>Cost pe-hrs/yr</th>
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<td>B1850</td>
<td>12636</td>
<td>2094.42</td>
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<td>BWmaHIST</td>
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- Status of experiments

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<tr>
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<th>CESM2-CAM6</th>
<th>CESM2-WACCM6</th>
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<tbody>
<tr>
<td>1850 Control</td>
<td>300 -&gt; 500 yrs</td>
<td>288 -&gt; 500 yrs</td>
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<td>Historical (1850-2014)</td>
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<td>Abrupt 4xCO₂</td>
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<td>Last Millennium (850-1850)</td>
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**CESM2-CAM6**

**FV2x1 Hist**

**Model Performance Summary: Mean Pattern Correlation: Sorted for Overall Score**

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<th>OVERALL</th>
<th>ENERGY</th>
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<th>ANNUAL</th>
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**CMIP6 DECK historical**

From John Fasullo
Greenland Surface Mass Balance: Last decades of 20th century

From Leo van Kampenhout
CMIP6 Tier 1-2-3 Paleo Experiments
CMIP6 Tier 1 Paleo Experiments

- **Completed (700 yrs)**
  - Mid-Holocene (*midHolocene*)
  - Last Interglacial (*lig127k*)

- **Still to be completed**
  - Last Millennium (*past1000*)
  - Pliocene (*midPlioceneEoi400*)
  - Last Glacial Maximum (*lgm*)
Over next year
CESM2 PaleoWG Experiments (CSL)

• Tier 1 CMIP6: repeat with Water Isotopes

• Tier 2 CMIP6
  – Factorization expts for Pliocene
  – MH and LIG vegetation sensitivities
  – LIG meltwater (Heinrich 11) sensitivity
  – Glacial inception (116 ka) – two-way coupling to CISM2 extended grid

• Tier 3 CMIP6
  – Transient LIG (127-121ka) – two-way coupling to CISM2 Greenland ice sheet + BIOME4 vegetation
  – Transient Holocene (9ka-850CE) with CESM2@FV2x1 – incl. orbital, solar variability, volcanic eruptions, GHGs, land use/land cover, ice sheets, meltwater – CSL Community simulation

• PMIP4/DeepMIP Early Eocene Optimum (~53-51 Ma)
CESM PaleoWG Experiments

- Last millennium
- Holocene
- ~6 ka
- LGM, ~21 ka
- LIG, ~128 ka
- Pliocene, ~3.2 Ma
- Eocene, ~50 Ma

- Stomata Paleosols
- Antarctic Ice core
- Alkenone $\delta^{13}$C (crosses)
- Foraminiferal $\delta^{11}$B

- Ice core Observation
- Model Projections

- 1000 ppm
- 400 ppm

- RCP8.5
- RCP6
- RCP4.5
- RCP3PD

- Thousands of years B.P.
- Millions of years B.P.
- Years A.D.