Year in Review: Land Ice-Relevant Changes in CESM Since Last Winter

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With contributions from many others in the LIWG and the CESM Software Engineering Group (CSEG)
CESM Migration to GitHub
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Earth System Community Modeling Portal

Community Ice Sheet Model wrapper for CESM  http://www.cesm.ucar.edu/models/cesm2...

166 commits  2 branches  150 releases  6 contributors

Branch: master  New pull request

billsacks Merge branch 'add_manage_externals_file'

Latest commit 6305a39 13 days ago
CLM: Use MEC Even With SGLC

• Previously, CLM’s logic for whether to use multiple elevation classes (MEC) was tied to whether CISM was running

• Now even runs with a stub glacier model (SGLC) use the MEC scheme

• Computes SMB in each elevation class, but no downscaling

• Applications:
  ▶ Single-point / regional runs over glacier regions
  ▶ Achieving consistent physics in runs that cannot or don’t want to use CISM (e.g., runs with Gregorian calendar)
CLM's Glacier Regions
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glacier_region_behavior

single_at_atm_topo

multiple (virtual for CMIP6)
CLM's Glacier Regions

`glacier_region_melt_behavior`

`remains_in_place`

`replaced_by_ice`
CLM's Glacier Regions

glacier_region_ice_runoff_behavior

remains_ice

melted

remains_ice

melted
Remapping Changes

Bill Lipscomb, Mariana Vertenstein, Jeremy Fyke
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Other Changes

- Fixes to remapping of CISM’s runoff – relevant for two-way-coupled runs
  - Fixed major bug in remapping of CISM’s ice runoff to ocean: remapped runoff was too low by roughly a factor of 2-3
  - Tweaks to runoff mapping to work with POP’s Estuary Box Model (EBM)

- New options to reset CLM’s initial snow pack over glacier and/or non-glacier columns (Leo van Kampenhout)
  - Can be used when transitioning from offline spinup to coupled run
  - For glacier columns, can specify an elevation threshold

- Consistent atmospheric topography when running an I or JG compset with cplhist forcings (Mariana Vertenstein)
Some Software Priorities Over the Next Year

• Bring CISM2.1 into CESM

• Fix generation and use of TG forcings
  ▸ Currently, TG compsets should only be used for software testing, not science

• Allow multiple ice sheets (Brian Kauffman)

• Improved handling of water and energy conservation with dynamic landunits
  ▸ Avoiding large, fictitious fluxes
  ▸ Support new SMB definition (inclusion of snow pack)

• Some coupling edge cases
  ▸ e.g., CLM dictates more melt than CISM can accommodate

• Rework CISM’s time manager (general cleanup, allow Gregorian calendar) (Gunter Leguy)
CLM's Glacier Regions

- glacier_region_behavior
- glacier_region_melt_behavior
- glacier_region_ice_runoff_behavior

- single_at_atm_topo
  - remains_in_place
    - melted

- multiple (virtual for CMIP6)
  - replaced_by_ice
    - remains_ice
  - virtual
    - replaced_by_ice
    - remains_ice