

# CESM 2012

## Land Ice Working Group Summary

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and

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# Land Ice Working Group Highlights

Full parallelism of SEACISM, higher-order dycore; to be released as CISM 2.0 and part of CESM 1.1

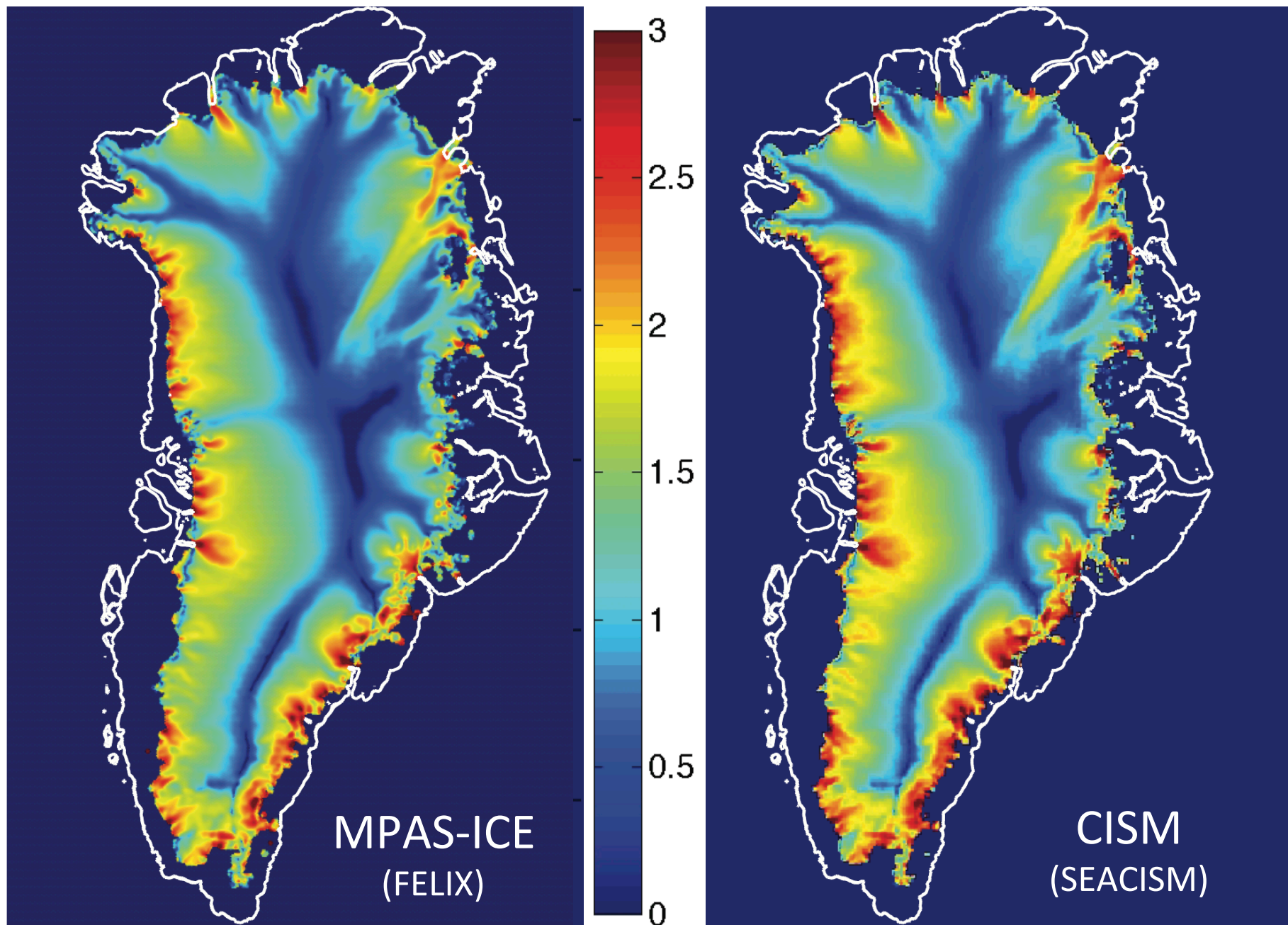
BISICLES dycore integration ongoing; accurate g.l. evolution via AMR

Significant progress on FELIX dycore in MPAS framework (=MPAS-LI)

Significant progress on ice-ocean coupling (POP2x)

Participation of CISM dycores in SeaRISE and Ice2Sea MIPS, to inform sea-level rise chapter of IPCC AR5

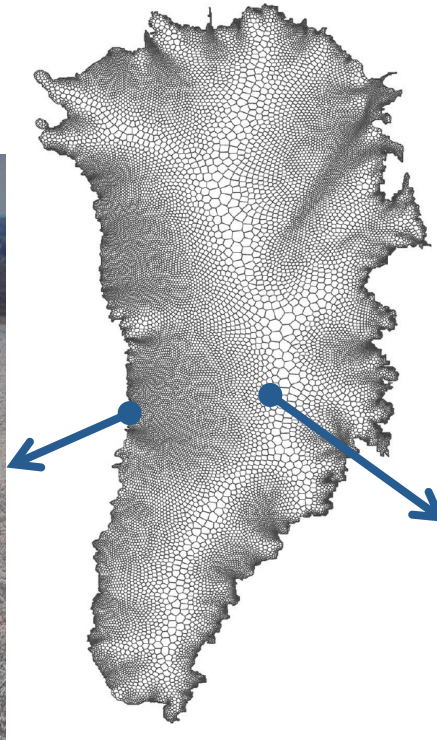
(Greenland = SEACISM, MPAS-LI; Antarctica = BISICLES)





# MPAS-LI: Variable-resolution grids for land ice

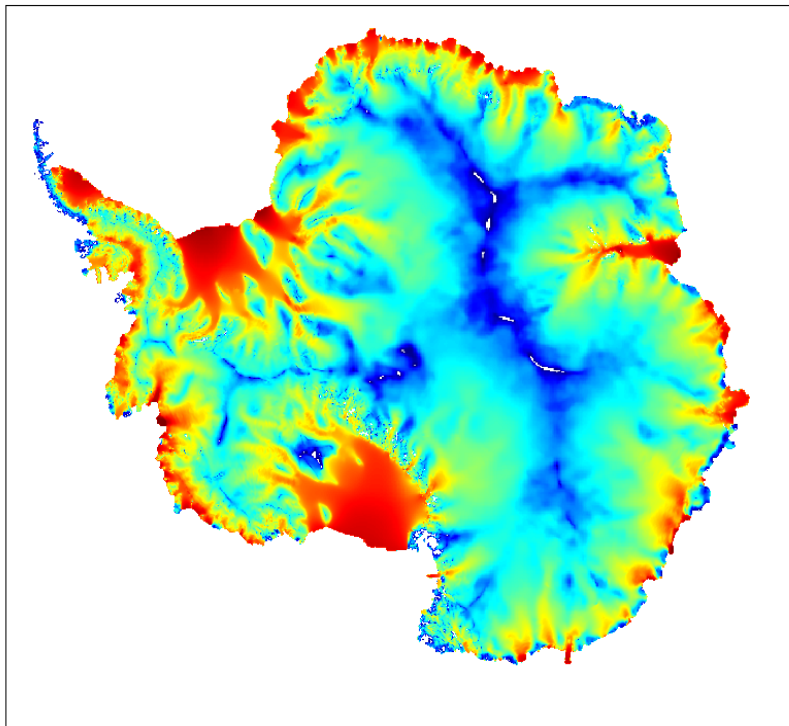
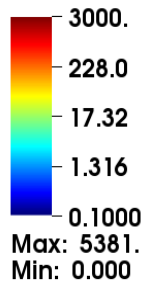
Allow for high resolution in regions of interest (e.g., outlet glaciers) and low resolution elsewhere (e.g., ice sheet interior), reducing computational burden by  $\sim 10\times$



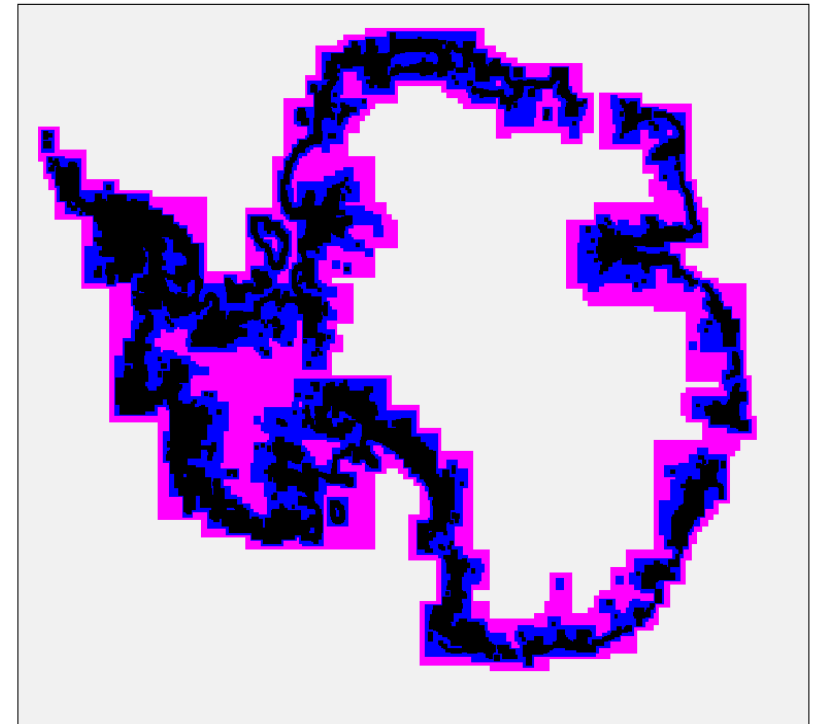
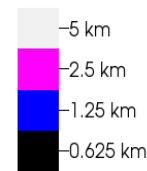
# Antarctica (Ice2Sea)

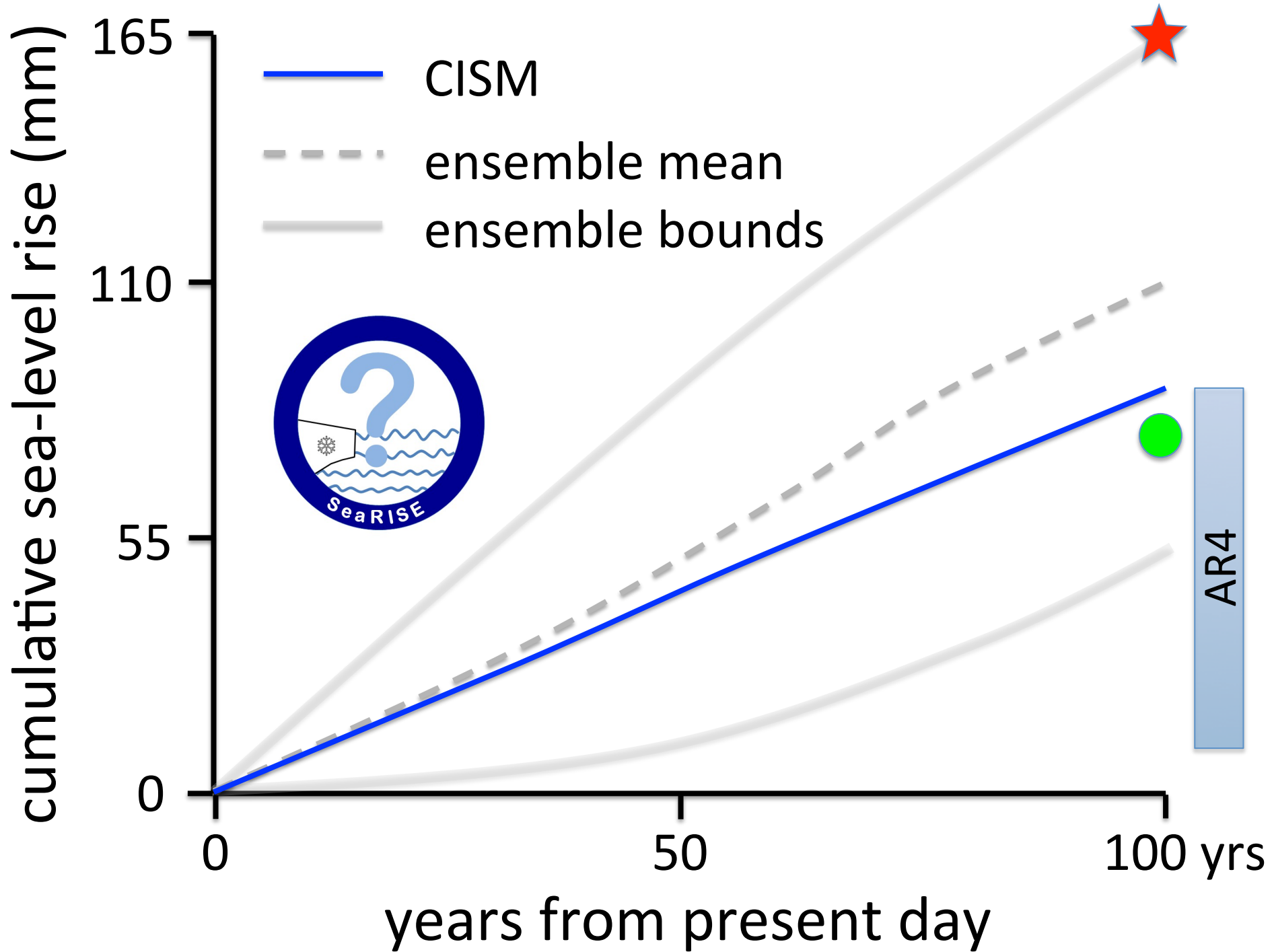
- Refinement based on Laplacian(velocity), grounding lines
- 5 km base mesh with 3 levels of refinement
  - base level (5 km): 409,600 cells (100% of domain)
  - level 1 (2.5 km): 370,112 cells (22.5% of domain)
  - Level 2 (1.25 km): 955,072 cells (14.6% of domain)
  - Level 3 (625 m): 2,065,536 cells (7.88% of domain)

Mag(Velocity)



Mesh Resolution





# CISM / CISM 2.0 update

Full parallelism of SEACISM dycore complete; release in fall as CISM 2.0

Coupling to BISICLES / Chombo ongoing; release with CISM  $\geq$  2.0

For realistic, 2-5 km resolution Greenland problems, SEACISM scaling to  $\sim 10^3$  cpus (running on  $\sim 10^4$  cpus)

CISM 2.0 currently undergoing testing, “robustification”, and general code clean-up (e.g., splitting of SIA and HO code; test cases; documentation; improving build system)

Work on implementation of CISM 2.0 in CESM 1.1 ongoing

Work on ocean model coupling ongoing

Work on coupling to other dycores (e.g., ISSM, PISM) and coupling to other climate models (e.g., NASA GISS, NASA Goddard)