

## **Advanced ice sheet modeling: Nonlinearly consistent continent-scale ice sheet simulations**

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The current ice sheet modeling capability within Glimmer-CISM continental ice sheet model solves the ice sheet momentum and thickness equations sequentially, so complex problems on fine grids experience convergence difficulties. Recently, a Jacobian-Free Newton-Krylov solution method has been implemented into the Glimmer-CISM model to produce more efficient and accurate solutions for a suite of test cases that mimic the Greenland ice sheet. Simulation results and performance analysis of the solution method and parallelization efforts are presented. We will outline ongoing work (1) to extend the solution method to include more dependent variables to be solved coherently and (2) scalable preconditioner development.