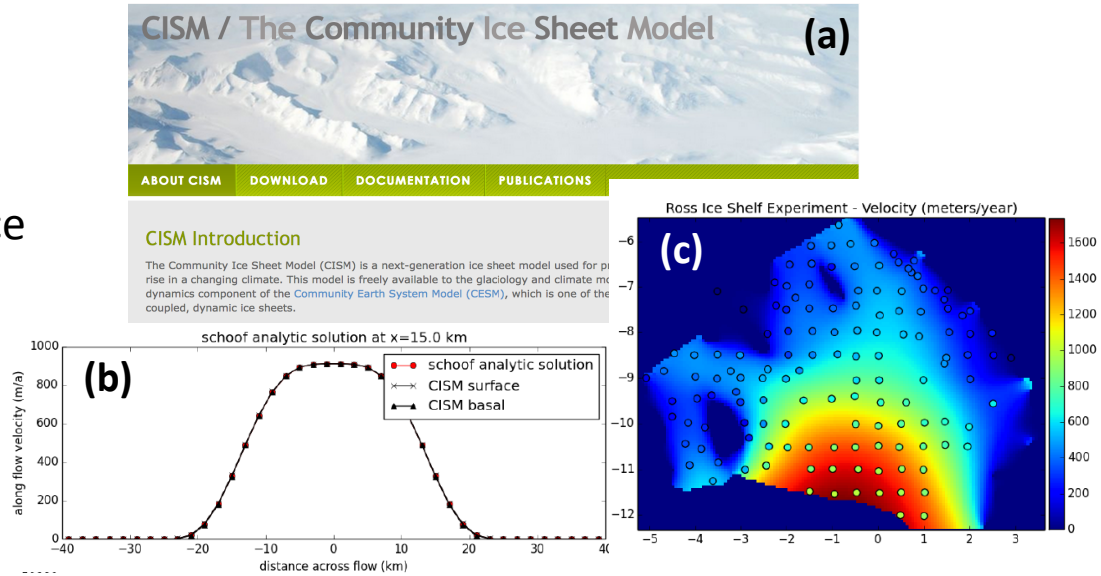
Community Ice Sheet Model (CISM) Version 2.0

Goal

Provide the glaciology and climate modeling communities with a robust, parallel, well-verified "higher-order" ice sheet model for both standalone and coupled climate experiments.

Approach

- Started with the UK Glimmer model (serial, shallow-ice approximation)
- Implemented scalable parallelism with interfaces to Trilinos solver libraries
- Built a 3D velocity solver with a hierarchy of flow approximations, including Blatter-Pattyn (accurate for fast-flowing ice streams, ice shelves)
- Added verification test cases
- Modified the climate model interface to support coupling to CESM/ACME
- Updated build system, documentation



(a) CISM website, http://oceans11.lanl.gov/cism/
(b) Ice speed (m/yr) simulated by CISM for the Schoof ice stream test problem, compared to the analytic solution.
(c) Ice speed (m/yr) of the Ross Ice Shelf simulated by CISM; dots show where observations are available for validation.

Impact

- First public release of a higher-order ice sheet model developed primarily with DOE support
- Efficient, portable code suitable for coupled climate simulations of ice-sheet evolution and sea-level rise

S.F. Price, W.H. Lipscomb, M.J. Hoffman, et al., 2014. CISM 2.0.0 Documentation, http://oceans11.lanl.gov/cism/.