



Dynamically coupling the full Stokes equations and the SIA - the ISCAL method

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The ISCAL (Ice Sheet Coupled Approximation Level) is a new method for computing ice sheet flow, implemented in the community ice-sheet model Elmer/Ice. ISCAL combines the exact Stokes equations with the set of equations obtained applying the Shallow Ice Approximation (SIA), confining the computationally cheap SIA to only those areas where it is accurate enough. The coupling is done dynamically and is based on SIA error estimates. In this way, the simulation times are significantly reduced, while the user has control over the error introduced by the approximations applied. Accuracy and efficiency is demonstrated using synthetic set-ups as well as for the Greenland Ice Sheet.