

Sensitivity of simulated ice-sheet evolution to the Glen's flow-law exponent

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Many modeling studies of ice-sheets adopt the 'Glen's flow-law' to represent ice deformation, which relates the stress and the strain rates by a power law of an exponent n . It has been indicated that a best value of the exponent is $n = 3$, with a plausible range of 2 to 4 (Cuffey and Paterson, 2010). Most of the modeling studies, however, have fixed the exponent as the best value 3, and the sensitivity of the result to the exponent uncertainties has not been studied systematically, in particular for large-scale ice-sheet problems. This study presents a series of simple sensitivity experiments to a variation of the flow-law exponent, using both a semi-analytical and a numerical thermodynamic ice-sheet models.