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Developmentof improved basal friction parameterizations using ISSM: Preliminary results for Greenland's Jakobshavn Ice Stream

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In ice flow models, the basal friction law links velocity at the ice-bed interface to drag at the glacial base. Accurate ice stream simulation relies on parameterization of this relationship, but basal drag cannot be measured observationally, remaining a key unknown in ice flow modeling. The Ice Sheet System Model (ISSM), developed at the California Institute of Technology's Jet Propulsion Laboratory (JPL) in collaboration with UC Irvine, is a state of the art, finite-element model capable of simulating 3-D transient ice flow on an anisotropic mesh and incorporating data assimilation through use of inverse control methods. As part of a larger development effort to improve simulation/understanding of ice sheet evolution in Greenland and Antarctica, we present preliminary results from ISSM for the sensitivity of Greenland's Jakobshavn ice stream to a range of friction law parameterizations, with model-data comparisons for the surface flow field. This work has implications for ice sheet model development and understanding of ice sheet slippage events. This work was performed at JPL under a contract with the National Aeronautics and Space Administration's Modeling, Analysis and Prediction (MAP) Program.