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# Extracting information about non-linear basal processes from surface measurements

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It is one of the interesting facts of modern glaciology that despite decades of research there is still no general consensus on the most appropriate form of the basal boundary condition to be used in modelling larger ice masses. Although it seems clear that a mixed (Robin) type boundary condition, where basal motion is described as a function of basal stresses, is needed, there is little agreement on what function should be used. Currently the most used mixed-type boundary conditions is the Weertman sliding law which is a power-law. Review of the literature shows that values for the stress exponent in Weertman sliding law used in numerical modelling cover the entire range from 1 to infinity. This situation appears puzzling. If the stress exponent is an important model parameter, one would expect that it's value could be accurately determined through model optimisation. In this paper I will address the question of how the strength of nonlinear basal processes, as measured by the value of the Weertman stress coefficient, can be estimated from surface data. By using Bayesian inverse methods conditions on data quality and data density required for extracting information about non-linear basal processes are investigated.