



On the inverse problem of estimating ice thicknesses from surface data

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The availability of good quality surface data on velocity, topography, and in some instances rates of elevation change, has made it increasingly feasible to invert for bed topography using surface data. The problem is, as generally tends to be the case for such inverse problems, ill posed and may not have a unique solution. I will discuss some of the general aspects of this problem related to information transfer both from the bed to the surface as well as from surface-to-bed. Methods used in the past can generally be split into two groups: those involving the use of the momentum equation, and those using mass conservation approach. In addition many methods appear in effect to be 'educated guestimates' using methodology that one would generally not expect to provide sensible answers. I will present a new method using both jointly the momentum and the mass conservation equations and give examples for the use of the method in both synthetic and realistic settings.