



Results from ITMIX – the Ice Thickness Models Intercomparison eXperiment

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Knowledge about the ice thickness distribution of a given glacier or ice cap is essential for a number of glaciological and hydrological applications. Yet, the ice thickness of the majority of worlds' ice masses remains poorly constrained. Recently, significant advances have been made in numerical methods that infer glacier ice thickness from surface characteristics, and a number of approaches have been proposed. A comprehensive assessment of their performance, however, is missing to date.

Here, we present results from ITMIX – the Ice Thickness Models Intercomparison eXperiment – which was the first coordinated effort to assess the relative strengths and weaknesses of individual approaches. Operating in a working group of the International Association of Cryospheric Sciences, we present results from a total of 17 different models, applied over 21 test cases including glaciers, ice caps, and synthetic geometries.

We show that the results from individual approaches can differ largely, but that combining them into an ensemble-estimate can yield significantly improvements. Comparison against direct ice thickness measurements reveals that ensemble solution can achieve accuracies in the order of $10 \pm 24\%$ of the mean ice thickness. We additionally highlight how input-data quality can affect the estimates, and argue that better accounting for input-data uncertainty will be a key for an improved next generation of ice thickness estimation models.