



Can a deforming bed theory produce realistically sized ribbed moraine?

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A theory of sub-glacial till deformation which predicts the correct wavelength for ribbed moraine formation has emerged over the past few years. It relies on plausible values for ice velocity, shear stress and the water pressure beneath the ice, none of which are well constrained. These values are sufficient to define a till viscosity. A small amplitude version of the theory has been successfully compared with results from an extensive suite of ribbed moraine wavelength measurements taken from imagery of Europe and Canada (Dunlop and others, in preparation). Because it is small amplitude, the theory is unable to predict ribbed moraine amplitudes.

Despite these successes, the theory has been criticised by Schoof, who argues that the ribbed moraine produced may not have the correct amplitude. In this paper, the linearised theory is extended to large amplitude calculations using a numerical model. Simulations are presented and the success of the theory in predicting observed ribbed moraine amplitudes discussed.