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ASSESSING A DYNAMIC THEORY FOR RIBBED MORAINE FORMATION AND DRUMLIN FORMATION

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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. The wavelength of ribbed moraine formation is particularly dependent on the ice viscosity chosen, which is a much better constrained parameter. The theory is compared with an extensive suite of ribbed moraine wavelength measurements taken from imagery of Europe and Canada. The theory shows qualitative promise in explaining some aspects of drumlinisation of preexisiting relief, and can explain the curious phenomenon of drumlins having blunt ends at either or both ends. The theory has yet to explain drumlin formation as a 3d instability phenomenon, and may have some difficulties in explaining the relative thickneses of till carapaces and stratified cores, if these phenomena are associated with instabilities rather than drumlinisation of pre-existing features. In this paper, a recent version of the theory is presented and its successes and difficulties are discussed.