**The Cryosphere
Discussions**

Interactive comment on "A numerical study of glacier advance over deforming till" by G. J.-M. C. Leysinger Vieli and G. H. Gudmundsson

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I really like this paper. The authors have addressed some formidable modeling issues to produce an original and innovative study which - for the first time - models coupled ice and till deformation at the glacier scale. The approach taken allows the effects of different till rheologies to be explored, including a rheology closely approximating the the currently favoured Coulomb-plastic model. A very interesting product of the work is that it sheds light on a wide range of glacial landforms, and shows how different forms can be understood using a single flexible framework. An unexpected result of the work was that it accurately produced the form of push moraines, although this was not an explicit aim of the model. Such results increase confidence that the model usefully mirrors real processes occurring on soft glacier beds. The paper includes

a broad spectrum of references to the landform literature, and clearly explains how the modeling work is relevant to several (previously apparently disparate) problems in landform development. As a result, the paper will be of interest to a broad range of the glacier science community, including those concerned with the origin and significance of landforms, as well as those working on glacier flow.

I do not see the need for any revisions. Clearly, there are some ways in which the work could be extended, such as allowing ablation at the terminus, or exploring the effect of varying pore-water pressure. However, the present paper works very well as a self-contained piece of work, and adding any additional factors would make the paper less clear in its message. I congratulate the authors in an excellent and novel piece of work, and very much hope to see this work developed further in future.

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