

Referee report on ‘Assimilating near real-time mass balance stake readings into a model ensemble using a particle filter’

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Summary

In this manuscript, the authors develop a Bayesian method for incorporating photography-based observations of glacier melt into a multi-model ensemble of surface mass balance models via a particle filter. They show that different models fit the observations at different times and that their method is able to select between the different models through time. They find that the method performs very well in predicting cumulative mass balance, but more importantly, that it comes with robust estimates of uncertainty.

Major Comments

I reviewed this paper once before and suggested a variety of changes and clarifications. The authors have done an exceptional job in incorporating these suggestions, to the extent that I have not been able to identify anything I particularly disagree with in the new version. I find this manuscript to be well-written, scientifically sound, and a very interesting contribution to mass balance modelling specifically, and Bayesian methods in glaciology more generally.

Technical Corrections

L308–309 This is semantics, but the particle doesn’t change model during the resampling step: it ‘dies off’ and is replaced by another particle.