Interactive comment on "The importance of better mapping of stream networks using high resolution digital elevation models – upscaling from watershed scale to regional and national scales" *by* Anneli M. Ågren and William Lidberg

Anonymous Referee #1

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Summary and Contribution

The authors determine the best stream initiation threshold to delineate headwater streams in Sweden by comparing modeled stream networks to a national inventory of the presence or absence of small stream channels. As the authors discuss, maps of headwaters are highly inaccurate, yet more realistic estimates of stream length are essential for countless applications related to watershed and natural resource management. While the objective of better headwater mapping is worthwhile, I believe the study is simplistic, especially considering the wealth of existing research that models

more accurate headwater stream networks over large areas.

General Comments

The authors suggest that this study is one of the first attempts to model headwater streams from DEMs over a large scale. Although the authors are correct that accurate headwater stream models over large areas remain a challenge, there are myriad studies that already use some derivation of DEM data to improve stream network mapping (e.g. Sun et al., 2011; Julian et al., 2012; Elmore et al., 2013; Russell et al., 2015; González-Ferreras & Barquín, 2017; Jensen et al., 2018; Jaeger et al., 2019). In addition, the practice of selecting a channel initiation threshold to match available field data – although useful for many practical applications – is quite basic and does not represent a significant contribution to the scientific literature. The authors state in the discussion that other methods are not appropriate for the presence/absence data from the national inventory, but I do not believe this statement is correct; on the contrary, presence/absence data are necessary for logistic regression models, for example.

The abstract mentions the selection of stream initiation thresholds across physiographic regions, but the authors appear to only create a single global model across all of Sweden. In addition, the residual analysis is quite limited. Although the description of the placement of false negatives and false positives in relation to quaternary deposits, terrain, and other factors is interesting, the authors could provide further analysis, visualization, and/or discussion to explain these patterns.

Finally, the manuscript requires further English language editing to correct spelling and grammar, particularly in the form of verb-number agreement and comma placement.