

## ***Interactive comment on “Ground subsidence effects on simulating dynamic high latitude surface inundation under permafrost thaw using CLM5” by Altug Ekici et al.***

### **Anonymous Referee #3**

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#### General comments:

Ekici et al. propose a new model parameterization to represent surface water dynamics caused by ground subsidence in CLM (Community Land Model). The subsidence level is coupled with a microtopography parameter in TOPMODEL approach. This study is the first step to quantify complicated processes in permafrost regions with Earth system models.

#### Special comments:

p.3 l.1: Could you explain the effect of the modified parameters (e.g. microtopography distribution and surface inundated fraction) on the entire model? Those descriptions

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would be helpful to understand the proposed parameterization is crucial to assess the biogeochemical feedbacks.

p.3 l.24-33: The delineation of the actual relationship between ground subsidence and microtopography is necessary to understand the relevance of modeling instead of a required parameterization by governing equations in CLM.

p.3 l.35: Related to the previous comment, if you could calculate more realistic value of microsigma with finer-resolution topographic data and subsidence information, does it improve the model applicability? It would be helpful if you explain the limitation of "modeling (conceptualization)" and "parameterization" respectively.

p.10 fig.6: As the authors pointed out, it is difficult to directly compare inundated area between GIEMS dataset and simulated results due to the gap of definitions of water surface. However, I think some other variables relating water budget (e.g. river discharge) are modified by the proposed parameterization and can be compared with observation data. I apologize if I misunderstand the numerical implementation in CLM.

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Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2019-4>, 2019.