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

Received and published: 20 June 2019

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 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.