

Interactive comment on “SaLEM (v1.0) – A Soil and Landscape Evolution Model for simulation of regolith depth in periglacial environments” by Michael Bock et al.

Anonymous Referee #2

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This manuscript is dealing with a new concept for dynamic modeling of parent soil material and periglacial layers by the parameters of different bedrock material and climate conditions. This is an innovative approach to delineate soil texture in areas of higher latitude. However, as the authors mention themselves, it is a first step on the way to a complex model, which needs to include at least more calibration parameters and especially more precise validation data during further research. Actually, this kind of research meets the state of art for digital soil mapping and therefore meets the subject of the journal Geoscientific Model Development and should be published after some revisions.

C1

A big difference of the presented model SaLEM to existing procedures is the dynamic modelling of the temporal development and vertical extension of the regolith layer by the parametrization of the geomorphological processes and paleoclimate. However, it is a common method to divide the periglacial layers in up to 4 stratigraphic units, also named cover-beds or in the German soil science known as Basislage, Mittel- lage, Hauptlage and sometimes Oberlage. The stratification of the periglacial layers is connected to periods of specific climatic conditions, which induce different morpho- dynamic processes. The variation in geomorphological activity should occur in the processed data when including paleoclimatic time sequences. In addition, the effective amount of aeolian sediment input during different glacial periods has an influence on the vertical composition of the regolith. This background makes it is necessary do discuss this phenomenon and how it is treated in model with few sentences. Is there any evidence for vertical soil texture distribution in the processed data? There is no information about this problem in the manuscript. In most cases, SaLEM produces regolith thickness of more than 1 m. In contrast, the maximum depth of soil cover in the validation data is 1 m. Therefore, the evaluation by this data makes only sense for mu or summit areas. Spending few days of fieldwork to execute some Pürckhauer drillings deeper than 1 m at specific sites would strongly increase the reliability of validation of the model results. At several parts of the manuscript dimensions, parameter and values need more detailed explication.

You will find detailed comments in the supplemented pdf.

Please also note the supplement to this comment:

<https://www.geosci-model-dev-discuss.net/gmd-2017-218/gmd-2017-218-RC2-supplement.pdf>

Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2017-218>, 2017.

C2