Comment on gmd-2021-223

Anonymous Referee #2

Referee comment on "CSDMS: a community platform for numerical modeling of Earth surface processes" by Gregory E. Tucker et al., Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2021-223-RC2, 2021

This manuscript outlines the challenges, opportunities, and contributions of the Community Surface Dynamics Modeling System (CSDMS) community towards advancing integrated, extensible, and reproducible modeling of Earth surface processes. The authors provide some conceptual context for the problem and issues that they are addressing, which is the increasing importance of models in Earth surface processes, in conjuction with some of the challenges that this growing and evolving facet of Earth science is experiencing. The authors outline an interesting set of model operations – drawing a comparison with Bloom's Taxonomy – of increasing complexity that are required of models. They then review a suite of tools developed in support of the CSDMS effort that address varying aspects of this taxonomy.

The manuscript is very well written and organized. I am particularly fond of their proposed taxonomy and believe that could be the basis of further expanding how we not only think of models, but also how we thinking about educating scientists about models. I presents relevant examples using tools within the CSDMS ecosystem, as well as an overview of the ways that CSDMS seeks to promote development and acquisition of modeling skills and habits of mind in the community.

In all honesty, I cannot find any significant errors or issues within this manuscript. My only very minor quibble is that I believe that the authors could perhaps elaborate more on some of the more future-oriented challenges, particularly as they relate to educating the next generation of scientists. The authors, in the Discussion, allude to a set of skills that CSDMS has observed are important for modeling and I wonder if those could be posed as learning outcomes that might be necessary for students. Could, for example, figure 2 be replicated along with some key skills or learning outcomes that are appropriate to each of these operations. To be clear, I don't think the authors need to address this suggestion, as it may be beyond the scope of this manuscript, but that is what immediately came to mind when I read the article.

I believe this manuscript makes an important contribution to the Earth surface modeling community and suggest that it be published in its present form.