

Interactive comment on “GIS-based topographic reconstruction and geomechanical modelling of the Köfels Rock Slide” by Christian Zangerl et al.

Gregor Ortner (Referee)

gregor.ortner@sfl.ch

Received and published: 9 October 2020

All in all, it is a good and solidly constructed paper that contains a lot of work and effort. The authors had an unusually good initial situation regarding the available data and comparative studies. They have taken good advantage of it. The used approach is reasonably chosen and corresponds to the common standards and practice in this field and leads to an interesting outcome. And thus contributes to an increase of knowledge in the field of land slide analysis.

Specific comments

Basically the modeling strategy is clear and reasonable. To be able to reconstruct and model a mass movements in retrospect, it is clear that some assumptions must be

C1

made. These assumptions have a major impact on the final result. As a reader I found it somewhat difficult to fully follow the choice of the assumptions and parameterization made for modelling. It would be desirable that the origin of a chosen parameters is clearly declared and referenced and the choice of the parameters is sufficiently justified.

This concerns especially the chapter “3.3.2 Model geometry, boundary and initial conditions” and “3.3.3 Material properties” as well as and the choice of water horizons in the model

- Model boundarys - Hydrostatic water pressure - Material properties

The choice of geotechnical parameters as well as the groundwater horizons should be addressed in the discussion and covered in a separate sub-section "Uncertainties" or "Model Uncertainties". In this subsection also the results of the modeling (with and without pore water pressure) should be discussed and critically reviewed.

Technical corrections

Line: 84: “exceptional high groundwater levels” -> It would be interesting to know how to reach this assumption Line:110 – 114: Mention when the landslide was Line:119: briefly mention where the value of the volume 3km³ originates from Line:127: “Taufenberg” in Fig.1 not not labeled in Fig.2 called “Tauferer Berg” please label uniformly Line:128: please label “Horlauchtal valley” in the figures Line:135-137: “This distinctive fragmentation of rock led to radon gas emissions and locally radioactive springs, which still affects today’s population in Umhausen and causes noticeably high cancer rates (Purtscheller et al. 1995).” -> interesting but irrelevant

Line:158 - 160: “To what extent permafrost degradation is able to trigger a deep-seated rock slides characterized by a shear zone at a depth of several hundred metres, is unclear and still under discussion (Nicolussi et al. 2015).” -> perhaps not even worth mentioning

C2

Line:215: "Estimation of rock mass strength and shear strength of discontinuities was done" -> please briefly explain how

Figures: Style is all a bit "old school" but of course sufficient. Sometimes the labeling of Figs is not consistent with the text. Fig.1d: it would be nice if the jointsets are marked with colored lines and flags for the dip for better visualisation.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2020-234>, 2020.