

EGU21-246

<https://doi.org/10.5194/egusphere-egu21-246>

EGU General Assembly 2021

© Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.



Climate change will impact the protective effect of forests against rockfall

Christine Moos^{1,3}, Antoine Guisan^{3,2}, Randin Christophe^{2,4}, and Lischke Heike

¹University of Lausanne, Interdisciplinary Centre for Mountain Research, Sion, Switzerland (christine.moos@unil.ch)

²University of Lausanne, Department of Ecology & Evolution, Lausanne, Switzerland

³University of Lausanne, Institute of Earth Surface Dynamics, Lausanne, Switzerland

⁴Centre Alpien de Phytogéographie, Champex-Lac, Switzerland

In mountain areas, forests play a crucial role in protecting people and assets from natural hazards, such as rockfall. Their protective effect is strongly influenced by their structure and state, which are expected to be affected by climate change. More frequent drought events, but also changing natural disturbance regimes, may lead to abrupt diebacks of contemporary species followed by a slow reforestation. In this study, we investigated how a changing climate can affect the protective capacity of mountain forests against rockfall. We therefore combined dynamic forest modelling with a detailed rockfall risk analysis at three case study sites in the Western Swiss Alps. Future forest development was simulated for a moderate and an extreme climate scenario for 200 years with the dynamic forest model TreeMig (Lischke et al., 2006). We then calculated rockfall risk for different forest states based on three-dimensional rockfall simulations with RockyFor3D (Dorren 2016). First results indicate that both at high elevation near the tree line (1500-2200 m a.s.l.) as well as at lower elevations (500-1000 m a.s.l.), increasing drought can lead to diebacks of trees and a reduction of tree density and diameters resulting in a substantial loss of the protective function. Depending on the speed of migration of other, more drought tolerant species, this loss can be partially compensated, but a permanent reduction of the protective effect is to be expected at least for an extreme climate scenario due to a reduced basal area of the forest.