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Sammendrag / Abstract

A persistent problem in rockfall hazard assessments is the use of different definitions and methodologies within rockfall models used for hazard zone mapping. The primary purpose of this thesis is to study the parameter sensitivity in three prevalent rockfall models to quantify the robustness of the models. The applied rockfall models were RAMMS::ROCKFALL, Rockyfor3D, and RocFall. Fieldwork from four rockfall locations in Lærdal and Aurland in Western Norway was conducted to collect realistic input data for analyses. Sensitivity analyses of what were considered the most influential parameters were performed. A particular emphasis was put on modeled runout lengths following the adjustments of individual input parameters. The robustness of the models was validated based on the analyses results. Furthermore, the models were evaluated based on their total performance and whether suitable for hazard mapping of rockfalls. The studied parameters were block- and slope

characteristics, the effect of forest, and analyses in different model approaches in the specified models. Studies regarding block volume trended differently within each model as larger block volumes had longer runout lengths in RAMMS::ROCKFALL and Rockyfor3D, while smaller block volumes had longer runouts in RocFall. The investigation of different block shapes related spherical shapes to longer runout lengths compared with more angular shapes. Analyses regarding slope characteristics such as terrain material and spatial resolution are complex as the models are based on different approaches. Findings showed that the parameters defining the terrain were exceptionally sensitive, and the comparison of predefined materials from the available software manuals was not sufficient for realistic model outputs. Applying different spatial resolution to the models were complicated due to the excessive amount of data required. Sensitivity analyses including forest confirmed general assumptions regarding the mitigation effect of forests. The work has shown that applying different model approaches were valuable as different aspects were considered by assessing separate applications. Based on findings in this study, Rockyfor3D was determined to offer the best total performance of the three models regarding hazard zone mapping on Norwegian conditions.