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Determining the impact of a changing climate on avalanche hazard potential – A practical approach

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The earths climate is changing – today there is no doubt about this statement and there is also more or less consensus about the direction and the possible changing rates of climatologic parameters. However, several uncertainties regarding the possible impacts of a changing climate on natural hazard processes still exist.
This presentation is part of the research project RIMES (Climate Change and Natural Hazards Risk Management in Energy Systems) funded by the Austrian Climate Research Program (ACRP). The project aims at the optimization of risk management procedures to determine the vulnerability of an energy system with respect to natural hazards like avalanches, debris flow and sedimentation.
In the present study a practical approach is presented for assessing the status quo of the hazard potential for each object of a hydro power system (reservoir, pylons and infrastructure) against avalanches. Furthermore, within this procedure the rate of change of the hazard potential due to a changing climate will be determined. Therefore, two climate change scenarios, based on state of the art climate simulations, have been worked out. One of these scenarios will represent a probable development of the climate regarding to common climate models, whereas the second scenario will outline a worst-case scenario. Since, time series of meteorological parameters are needed for the aspired investigations within the project, we compile future weather data series for the period 2041-2070, based on the result of the climate change scenarios mentioned above along with the data of representative weather stations in the area under investigation. Therefore, the measured values of the air temperature and the precipitation of the period 1981-2010 have been changed in the following way: The predicted annual temperature and precipitation changes for the particular seasons according to the climate change scenario has been added to the measured temperature and precipitation data. For assessing the impacts on avalanches the changes in the new snow depth was needed. Hence, the new snow depth has been computed using the future temperature and precipitation data. On the basis of the past and the future time series the extreme values have been calculated in order to assess the hazard potential of avalanches and to determine future changes in frequency and/or magnitude of avalanches in the study area.
This work will contribute to the natural hazards risk management in a changing climate and give an insight on possible future change of the hazard potential of avalanches in an Alpine environment.