Quantifying the effect of early warning systems for mitigating risks from alpine hazards

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Early warning systems (EWS) are increasingly applied as flexible and non-intrusive measures for mitigating risks from alpine hazards. They are typically planed and installed in an ad-hoc manner and their effectiveness is not quantified, which is in contrast to structural risk mitigation measures. The effect of an EWS on the risk depends on human decision makers: experts interpret the signals from EWS, authorities decide on intervention measures and the public responds to the warnings. This interaction of the EWS with humans makes the quantification of their effectiveness challenging. Nevertheless, such a quantification is an important step in understanding, improving and justifying the use of EWS. We systematically discuss and demonstrate the factors that influence EWS effectiveness for alpine hazards, and present approaches and tools for analysing them. These include Bayesian network models, which are a powerful tool for an integral probabilistic assessment. The theory is illustrated through applications of warning systems for debris flow and rockfall hazards.

References:
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