



A simple model to assess flood risk in mountainous basins

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In high-elevation regions precipitation occurs in a liquid form over the portion of basin laying below the snow line (contributing area), while it is retained as snow in the upper part of the basin. Snow has therefore a mitigating effect on flood formation, because the directly contributing area is smaller than the total area of the basin. This is an intuitively relevant phenomenon that, however, has seldom been studied quantitatively. We propose a simple model to account for the reduction of the contributing area in mountainous basins and test the performances of the model towards some empirical data collected in North-Western Italy. Results confirm the validity of the hypotheses behind the model and the dependence between floods and elevation is reasonably explained. Thanks to its simple analytical structure, the model is suitable to investigate the vulnerability of alpine areas to climate change. Interesting indications on the increase of flood risk in mountainous areas are obtained by perturbing the temperature regime according to different climate change scenarios. The predicted rise in mean annual temperatures induces a generalized and relevant increase of the flood risk. More specifically, basins located between 1500 and 2500 m turn out to be the most vulnerable to global warming.