EGU2020-10062, updated on 04 Dec 2022
https://doi.org/10.5194/egusphere-egu2020-10062
EGU General Assembly 2020

Modeling of pluvial flash floods in pre-Alpine regions and assessment of potential climate change impacts

Andreas Huber[1], Simon Lumassegger[1], David Leidinger[2], Stefan Achleitner[1], Herbert Formayer[2], and Bernhard Kohl[3]

[1]Unit of Hydraulic Engineering, Institute for Infrastructure Engineering, University of Innsbruck, Innsbruck, Austria
[2]Institute of Meteorology and Climatology (BOKU-Met), University of Natural Resources and Life Sciences, Vienna, Austria
[3]Department of Natural Hazards, Austrian Research Centre for Forests (BFW), Innsbruck, Austria

In recent years the topic of flash flooding away from rivers and permanent watercourses has attracted increasing attention from the scientific community, public authorities and affected parts of the general public. Not only urban areas with a high proportion of sealed surfaces, but also rural areas have been adversely affected by pluvial flash floods (PFFs) or surface water floods (SWFs) in the recent past. Empirical evidence suggests that amongst others pre-Alpine areas (e.g. in Austria, Germany, Switzerland, ...) might be especially susceptible to this type of flooding. From a water-management perspective knowledge about potentially endangered areas is important for involved stake-holders as a basis for informed decisions on a variety of topics ranging from protection of existing infrastructure and adaptation of current land use practices to future settlement development. In the light of changing climatic conditions also information on projected future developments is highly desirable. With respect to the latter, an increasing number of datasets from national and pan-European climate-services has become publicly available. Also a growing proportion of two-dimensional hydrodynamic models supports direct rainfall as a boundary condition, thus addressing the special requirements for modeling of PFFs/SWFs.

We utilize different two-dimensional hydrodynamic models (unstructured-mesh, raster-based) in combination with an event-based hydrological approach to simulate the spatial distribution of surface runoff in response to heavy precipitation events for present conditions and under projected future conditions for small rural areas (< 2km²) in Upper Austria. The general applicability of the used modeling approach is demonstrated. However, also a number of remaining challenges related to the limited quantity and quality of observational data for model calibration and the definition of representative future scenarios is identified and discussed.