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# Spatio-temporal dynamics in the flood exposure due to land use changes

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Flood risk is expected to intensify in the future in many regions of the world. Consequently, the resulting flood damage is very likely to increase further on. Comprehensive flood risk analyses which are not only reliable for the contemporary state require therefore the consideration of the main drivers that influence flood risk. Human-induced changes in land use as well as climate change impacts on hydrological processes turned out to play a key role in future-orientated flood risk assessments. Even if there is strong evidence that global climate change will amplify flood risk especially in mountainous areas like the European Alps the accumulation of people and their assets in flood plains are seen as main causes of increasing flood risk. Therefore the analysis of spatio-temporal dynamics in the flood exposure due to land use changes is a crucial part for long-term and more robust flood risk analyses.

Within the frame of a study in the region of Reutte in Tyrol (Austria) flood risk time series for the next decades are developed by estimating the hazard potential as well as the flood impact, i.e. the flood losses. For the latter, future flood exposed residential and industrial areas are assessed by applying a spatially explicit land use change model and various inundation scenarios.

The land use simulations for the alpine study area were calculated by means of the CLUE-S model, respectively the newer Version Dyna-CLUE. This model simulates the spatial pattern of land-use in reaction to pre-defined changes of the future land use demand, suitable locations which are identified by means of logistic regression and user-specified decision rules as well as spatial policies (e.g. area zoning plans and danger zoning plans). For now, inundation areas were derived from the past flood event in August 2005 and the HORA project where flood extents for different recurrence intervals were simulated. The intersection of these flood plains with various land use scenarios allows finally an estimation of changes in the future flood exposure.

This information is not only essential for a further application in deriving potential flood losses but also an important basis for an appropriate, foresightful and sustainable spatial planning.