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DynaPop-X: A population dynamics model applied to spatio-temporal exposure assessment – Implementation aspects from the CRISMA project

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ABSTRACT

In the context of proactive disaster risk as well as immediate situational crisis management knowledge of locational social aspects in terms of spatio-temporal population distribution dynamics is considered among the most important factors for disaster impact minimization (Aubrecht et al., 2013a). This applies to both the pre-event stage for designing appropriate preparedness measures and to acute crisis situations when an event chain actually unfolds for efficient situation-aware response.

The presented DynaPop population dynamics model is developed at the interface of those interlinked crisis stages and aims at providing basic input for social impact evaluation and decision support in crisis management. The model provides the starting point for assessing population exposure dynamics – thus here labeled as DynaPop-X – which can either be applied in a sense of illustrating the changing locations and numbers of affected people at different stages during an event or as ex-ante estimations of probable and maximum expected clusters of affected population (Aubrecht et al., 2013b; Freire & Aubrecht, 2012).

DynaPop is implemented via a gridded spatial disaggregation approach and integrates previous efforts on spatio-temporal modeling that account for various aspects of population dynamics such as human mobility and activity patterns that are particularly relevant in picturing the highly dynamic daytime situation (Ahola et al., 2007; Bhaduri, 2008; Cockings et al., 2010). We will present ongoing developments particularly focusing on the implementation logic of the model using the emikat software tool, a data management system initially designed for inventorying and analysis of spatially resolved regional air pollutant emission scenarios.

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