Dr.-Ing. Kai Schröter

Kai is civil engineer by training with a specialisation in hydrology and water resources management and holds a PhD in engineering sciences from TU Darmstadt. Since 2012 Kai is a research fellow at the German Research Centre for Geosciences (GFZ) in the section Hydrology. His research focus is on understanding flood risk systems and on how we can incorporate interactions, feedbacks and dynamics of natural and socio-economic processes into flood risk assessment and management. In his research Kai explores new data sources and methods to better assess flood risks and improve flood risk modeling.

Project Summary: Advanced data integration methods towards large-scale flood impact indicators

Floods impact individuals and communities and have large social, economic and environmental consequences. These impacts are dynamic and vary largely depending on flood characteristics, vulnerability, and value of exposed elements. The understanding of large-scale flood impacts as the outcome of the complex system of atmospheric, hydrological, inundation and socio-economic processes including human interventions is still limited and so is the knowledge about controls, feedbacks, and changes in flood impacts. An improved understanding of this interplay is needed for manifold tasks in flood risk management, for instance emergency response and adaptation planning. With an increasing abundance of data from a growing number and diversity of sensors, methods of date science take a key role in extracting information and knowledge from these heterogeneous data sources to deepen insights into the generation and development of floods as well as the interactions between hazard, exposure and vulnerability in shaping flood impacts.
This project addresses two major challenges in exploiting the increasing volume of data and variety of parameters available. The first problem is related to making use of novel data sources and integrating these with data from established observation systems for the application case of rapid inundation depth mapping. The second problem concerns integrating disparate and heterogeneous data sources to explore and analyze controls on floods and impacts. These challenges are approached within a multi-variate data analytics framework of observations and simulation model outcomes of climate, hydrologic, inundation and impact variables. Data science methods are used to integrate large heterogeneous data sets and investigate the spatial and temporal dependencies of potential flood controls, their interactions as well as their causal relationships to flood impacts.
The key outcomes of this project are methods and tools for the fusion of multiple data sources for rapid inundation mapping and linking climate and atmospheric variables to flood impact indicators for enhanced flood event assessment.

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