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Multi-source flood mapping for rapid impact assessment

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Globally increasing flood losses due to anthropogenic climate change and growing exposure underline the need for effective emergency response and recovery. Knowing the inundation situation and resulting losses during or shortly after a flood is crucial for decision making in emergency response and recovery. With increasing amounts of data available from a growing number and diversity of sensors and data sources, data science methods offer great opportunities for combining data and extracting knowledge about flood processes in near real-time.

The main objective of this research is to develop a rapid and reliable flood depth mapping procedure by integrating information from multiple sensors and data sources. The created flood depth maps serve as input for the prediction of flood impacts. This contribution presents outcomes of a demonstration case using the flood of June 2013 in Dresden (Germany) where satellite remote sensing data, water level observations at the gauge Dresden and Volunteered Geographic Information based on social media images providing information about flooding are combined using statistical and machine learning-based data fusion algorithms. A detailed post-event inundation depth map based on terrestrial survey data and aerial images is available as a reference map and is used for evaluation. First results show that the individual datasets have different strengths and weaknesses. The combination of multiple data sources is able to counteract the weaknesses of single datasets and provide a significantly improved flood map and impact assessment. Our work is conducted within the Digital Earth Project (.