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# A simple and effective tool for flood scenario simulation and risk analysis

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A recent project between the University of Bologna and the Civil Protection of Emilia-Romagna Region in Italy was aimed at developping a tool to simulate flood scenario as a basis for risk analysis. Considering this framework, we developed a simple but effective 2D flood inundation model based on a simplified finite volume scheme, called CA2D. Several application to both numerical and real case studies were performed to investigate the model performance under different flow conditions. Thanks to the simple structure and different techniques to improve stability, the model is fast and particularly suited for large scale flood analysis. In particular, the code structure allows for massive code parallelization. Experiments proved that the model is able to reproduce both slow and fast flood events with a good accuracy in terms of water depths and velocity. Therefore, the model can be applied to simulate a wide range of flood event types, including lowland floods and flash floods in urban areas.Moreover we included in the framework a simple tool for flood vulnerability analysis.