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Introducing ProMaIDes: A State-of-the Science Flood Risk Management Tool

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Floods are natural hazards with severe socio-economic and environmental impacts on affected areas and societies every year. A chain of different processes being involved in a flooding - characterized by precipitation, topography, land use etc. - complicates the understanding of the dynamics of a flood. However, the prediction of probabilities, flood hazards, flooding extents, dike failure, consequences and understanding the ongoing processes during a flood event are important issues in flood risk management. Computational modelling is a key method in supporting flood risk management and tackling the mentioned challenges.

While several computer-based models for assisting flood risk management exist, typically they concentrate on only one component of the flood risk analysis chain such as rainfall generation, hydrological/hydraulic modelling or damage analysis. They do not merge the other components on one platform which may result in encapsulated conclusions. In recent years the availability of higher detailed data, larger study domains, more computational power and more innovative models paved the way for more effective solutions.

In this work we present ProMaIDes (Protection Measures against Inundation Decision support), an open-source, free software package for risk-based evaluation of flood risk mitigation measures¹. The software package consists of numerous relevant modules for a flood risk analysis in riverine and coastal regions: the HYD-module for a hydrodynamic analysis, the DAM-module for an analysis of consequences (including economical damage, consequences to people and the disruption of critical infrastructure services), the FPL-module for the reliability analysis of dikes and dunes as well as a combining RISK-module and the decision support MADM-module. To support a user-friendly model setup, visualization of input and data results, a connection with the free QGIS-system is established by QGIS-plugins and a PostgreSQL-database as data-management system. A detailed online documentation featuring theory, application and programming is available². A community of users is currently set-up.

In order to give a better understanding and to demonstrate the capabilities of ProMaIDes, the tool itself, but also the modules combined with case studies are shortly presented.

¹ <https://promaides.h2.de>

² <https://promaides.myjetbrains.com/youtrack/articles/PMID-A-7/General>