

Prediction of downstream discharge during overflow events using high-resolution satellite images

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Accurate prediction of downstream discharge during overflow events is essential for effective flood management and damage mitigation. While numerous studies have estimated discharge based on river width within the main channel, limited research has explored the predictive value of river width measurements within floodplains. Also, traditional discharge estimation methods largely rely on river width taken within the main channel. However, these approaches often overlook the floodplain, where water spreads beyond the bankfull capacity. The morphology of the floodplain differs significantly from the main channel, especially when the cross-section expands suddenly above the bankfull water level, leading to inaccuracies in discharge prediction.

This study predicts downstream discharge by measuring river widths in upstream areas using high-resolution satellite images. The analysis focuses on determining the respective widths in the main channel and floodplain during overflow events. A dataset of 163 high-resolution ICEYE satellite images from 2022 to 2023 was employed, providing detailed spatial information on river morphology across diverse flow conditions. By improving the accuracy of discharge predictions during overflow events, this study can support decision making processes in emergency response.