## Assimilation of One Satellite SAR Image for Flood Simulations. Method and Test Case (Mosel River).

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In river hydraulics, water level measurements can be available at gauging stations, but it is the main channel only and they are very sparse in space. Remote-sensed data such as satellite images are punctual in time but spatially distributed (eg snapshot of a flood extension). In this talk, we address the assimilation of one satellite SAR image of the flood plain, in addition to partial measurements at one gauge station (real data observed at Mosel river during a flood event). To this end, first we analyse the image and extract some reliable water elevation values, second we apply a variational data assimilation process. The numerical results show that the method makes it possible to improve the calibration of the model parameters (Manning coefficients) and potentially allows to identify the inflow discharge and/or the outflow rating curve.

In a second study, we elaborate a method which superposes locally a 2D shallowwater model (a local zoom model) over the 1D global shallow-water model. The superposition (coupling 1D-2D) is done using the optimal control approach by minimizing an extra misfit functional at interfaces. This approach allows to assimilate simultaneously the 2D local data into the 1D global model. The local zoom model makes local data come back up to the global model. These algorithms are implemented into our software DassFlow.

Keywords: Hydraulic modelling, satellite SAR images, variational data assimilation, coupling, shallow-water models.

## References

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