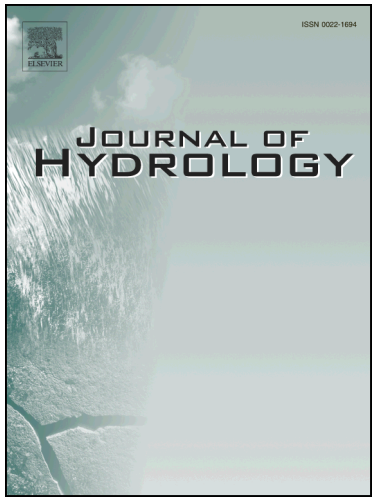


# On operational flood forecasting system involving 1D/2D coupled hydraulic model and data assimilation

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# On operational flood forecasting system involving 1D/2D coupled hydraulic model and data assimilation

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**Abstract**

In the context of hydrodynamic modeling, the use of 2D models is adapted in areas where the flow is not mono-dimensional (confluence zones, flood plains). Nonetheless the lack of field data and the computational cost constraints limit the extensive use of 2D models for operational flood forecasting. Multi-dimensional coupling offers a solution with 1D models where the flow is mono-dimensional and with local 2D models where needed. This solution allows for the representation of complex processes in 2D models, while the simulated hydraulic state is significantly better than that of the full 1D model. In this study, coupling is implemented between three 1D sub-models and a local 2D model for a confluence on the Adour river (France). A Schwarz algorithm is implemented to guarantee the continuity of the variables at the 1D/2D interfaces while *in situ* observations are assimilated in the 1D sub-models to improve results and forecasts in operational mode as carried out by the French flood forecasting services. An implementation of the coupling and data assimilation (DA) solution with domain decomposition and task/data parallelism is proposed so that it is compatible with operational constraints. The coupling with the 2D model improves the simulated hydraulic state compared to a global 1D model, and DA improves results in 1D and 2D areas.

*Keywords:*

Hydraulic modeling, multi-dimensional coupling, data assimilation, domain decomposition, real time flood forecasting