

Sediment sorting at a side channel bifurcation

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Side channels have been constructed to reduce the flood risk and to increase the ecological value of the river. In various Dutch side channels large aggradation in these channels occurred after construction. Measurements show that the grain size of the deposited sediment in the side channel is smaller than the grain size found on the bed of the main channel. This suggests that sorting occurs at the bifurcation of the side channel. The objective is to reproduce with a 2D morphological model the fining of the bed in the side channel and to study the effect of the sediment sorting on morphodynamic development of the side channel.

We use a 2D Delft3D model with two sediment fractions. The first fraction corresponds with the grain size that can be found on the bed of the main channel and the second fraction corresponds with the grain size found in the side channel. With the numerical model we compute several side channel configurations in which we vary the length and the width of the side channel, and the curvature of the upstream channel. From these computations we can derive the equilibrium state and the time scale of the morphodynamic development of the side channel.

Preliminary results show that even when a simple sediment transport relation is used, like Engelund & Hansen, more fine sediment enters the side channel than coarse sediment. This is as expected, and is probably related to the bed slope effects which are a function of the Shields parameter. It is expected that by adding a sill at the entrance of the side channel the slope effect increases. This might reduce the amount of coarse sediment which enters the side channel even more. It is unclear whether the model used is able to reproduce the effect of such a sill correctly as modelling a sill and reproducing the correct hydrodynamic and morphodynamic behaviour is not straightforward in a 2D model.

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