Exercise 2 – Answers

Examine the `.bci` files and check what they are doing. Why are they different?

The `.bci` files tell lisflood what the boundary conditions of the domain are, not including those specifically associated with the channel. This includes how the flow of water should be treated at the domain boundaries and can also include point sources of water within the domain. Using the 1D kinematic or diffusive solvers river channel boundary conditions are input using the `.river` files, whilst using the subgrid channel solver water input from the river channel is included as point sources within the `.bci` file. Boundary conditions in exercise 2 example are outlined below:

1D Kinematic and Diffusive models:

From the `.bci` file - water flowing out of the domain (east side) must do so with a fixed free surface elevation of 68.43 m.

Subgrid model:

From the `.bci` file - water flowing out of the domain (east side) must do so with a fixed free surface elevation of 68.43 m. Also a point source is specified in the cell which coincides with the first cell of the river channel (the subgrid model uses the `SGCwidth` file to identify channel location). It is a fixed volume flux point source with a value of 1.46 m^2s^{-1} which will be multiplied by the cell width to give a value of 73 m^3s^{-1}.

Examine the `.river` files used by the kinematic and diffusive solvers. What information is provided in these files? What are the standard differences between them?[1]

Both `.river` files –specify that the volume of water flowing into the first cell of the river channel is fixed with time at 73 m^3s^{-1}. Additionally, for the diffusive solver a downstream boundary condition must be specified. Here water in the last cell specified as part of the river channel must have a free surface elevation of 69.3 m (with a specified bed elevation of 67.139 m this means a water depth of 2.161 m).

In this example, which model is best at predicted the flood inundation event in the Flood River Valley?

Model	A (Dry/dry)	B (predicted dry but observed wet)	C (Predicted wet but observed dry)	D (Wet/wet)	F
Kinematic	3069	347	27	205	0.354059
Diffusive	2977	51	119	501	0.746647[2]
Subgrid	2967	59	129	493	0.723935

[1] You will notice there are differences in the Manning's friction properties for all of the different model set-ups. This is because in each case the models have been calibrated to give the most accurate results.

[2] NOTE: This test-case was originally used to evaluate the 1D diffusive solver set-up which is why it has the highest fstat value even though it uses the flow-limited 2D solver which is known to poorly represent floodplain dynamics. By spending more time calibrating the model set-up it is expected to be possible to improve the accuracy of the subgrid model for this test-case.

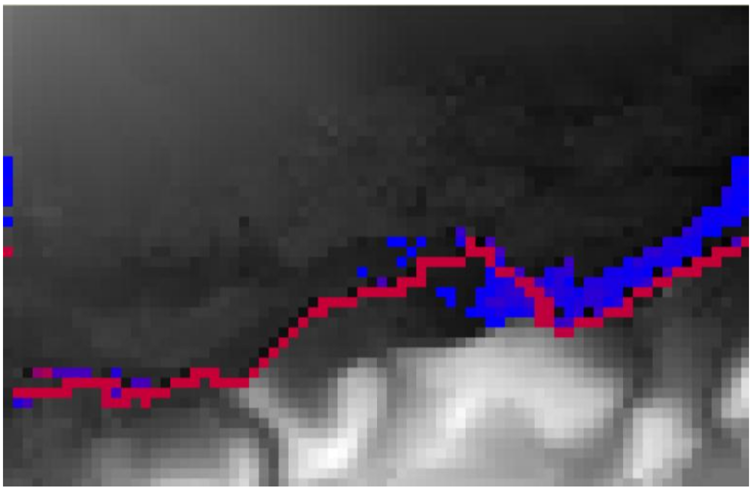

Figure 1. Final water depth file for 1D kinematic model presented in FloodView

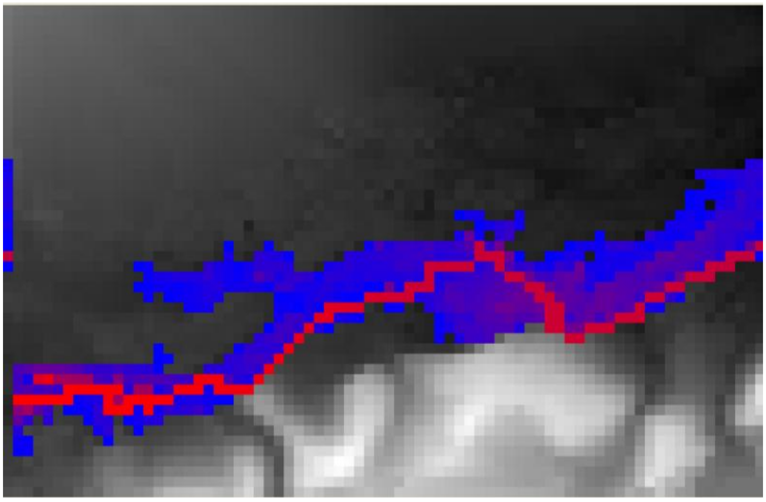

Figure 2 Final water depth file for 1D diffusive model presented in FloodView

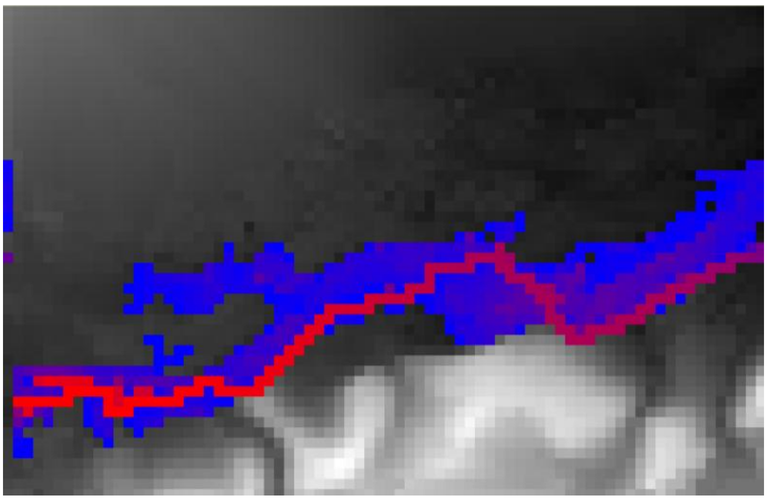

Figure 3 Final water depth file for subgrid model presented in FloodView

Note: These results are bases on simulations using Lisflood version 5.8.6. Although results are not expected to change using future versions, very minor changes cannot be ruled out.