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High resolution modelling of flow through vegetation canopies: Implications for river morphodynamics

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In-channel vegetation has a profound effect upon flow, and consequently sediment transport, within natural rivers. Thus, a good process knowledge of the interaction between flow and vegetation is key to understanding river morphodynamics. Here, we present results from high resolution modelling of flow-vegetation interactions within an idealised vegetation canopy. The vegetation is represented using a dynamic biomechanical model, capable of replicating the time-dependent response of the canopy to the flow. The model allows investigation of the turbulent flow structure throughout the canopy in a manner that is not yet not possible with either flume or field experiments. Furthermore, it also allows for the quantification of key process drivers such as drag and shear stress throughout the canopy, which directly impact upon sediment transport. Our results demonstrate the spatial heterogeneity of flow through canopies and the role of large-scale turbulent structures in determining sediment transport through canopies.