Lateral transport correction in morphodynamic simulations: why playing with that? (and why you should not)

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Abstract: Bedload sediment transport is influenced by bed slope, a critical factor when modeling interactions between water flow and alluvial beds in two- and three-dimensional frameworks. However, many numerical morphodynamic models are setup with exaggerated values of transverse bed slopes compared to laboratory experiments. In this talk, I'll explore the mathematical consequences of this choice and highlight how factors like mesh resolution, numerical schemes, and missing physical processes often drive these discrepancies. By adding artificial diffusion, exaggerated values of transverse bed slopes might compensate for other inaccuracies—but at the cost of altering expected bed morphodynamic processes. I'll discuss how considering root causes can improve model reliability and ensure slope effect coefficients align with empirical studies.