



Highs & Lows of Riverbeds

Quantifying the impact of grain-scale topography on sediment transport rates

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Landscapes evolve by transporting sediment



Toad River Valley, Canada

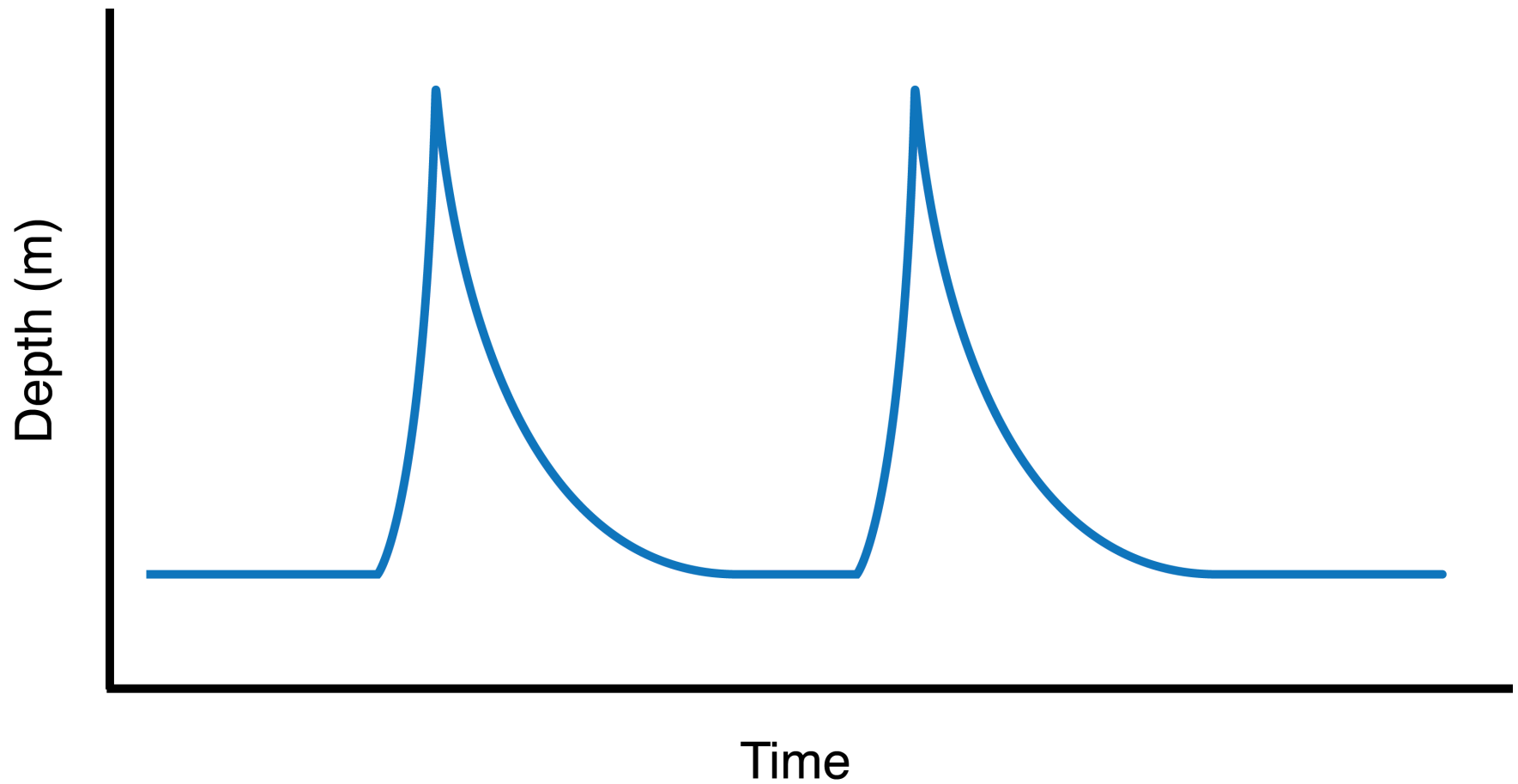
Landscapes evolve by transporting sediment



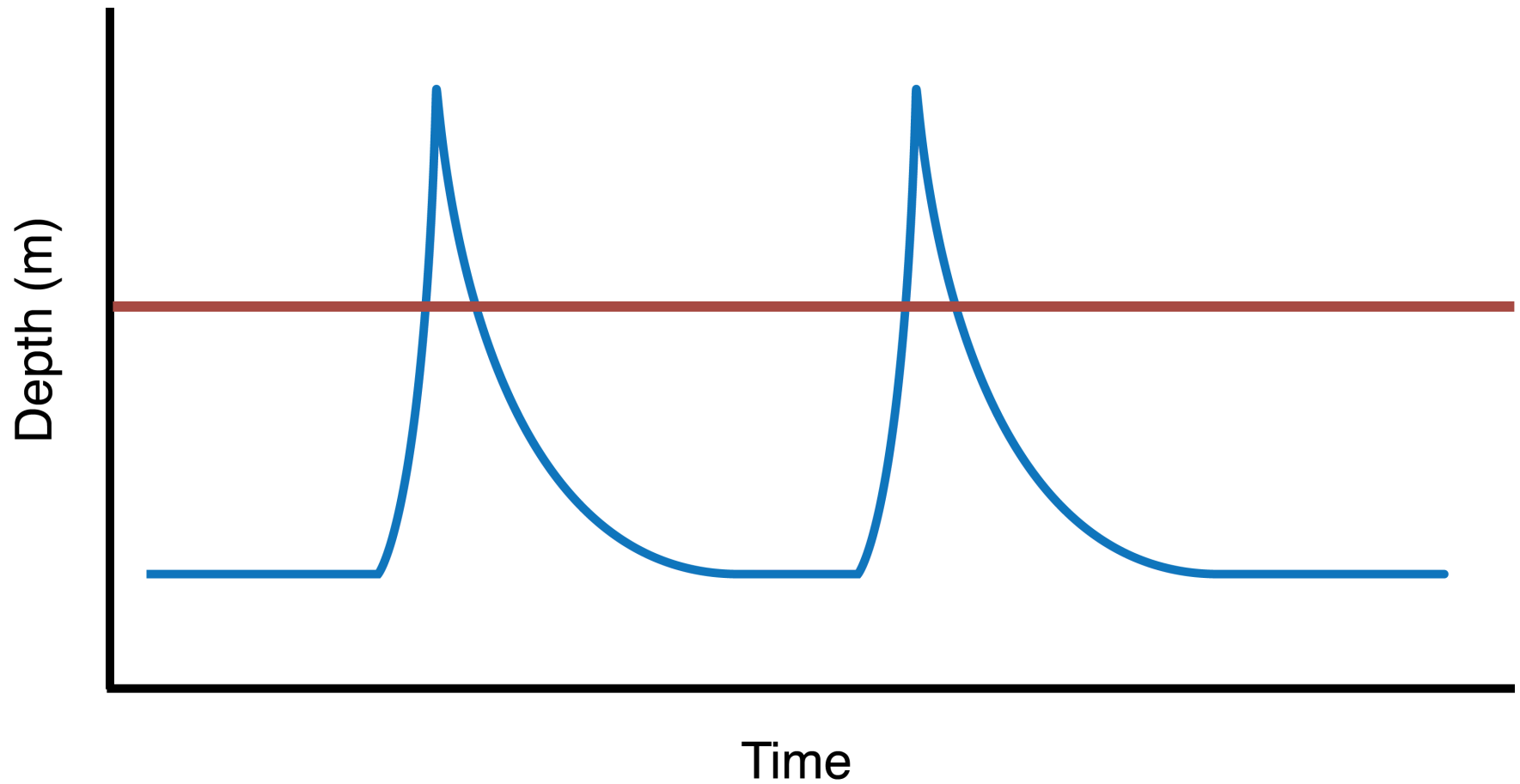
Under what conditions does sediment move in river systems?



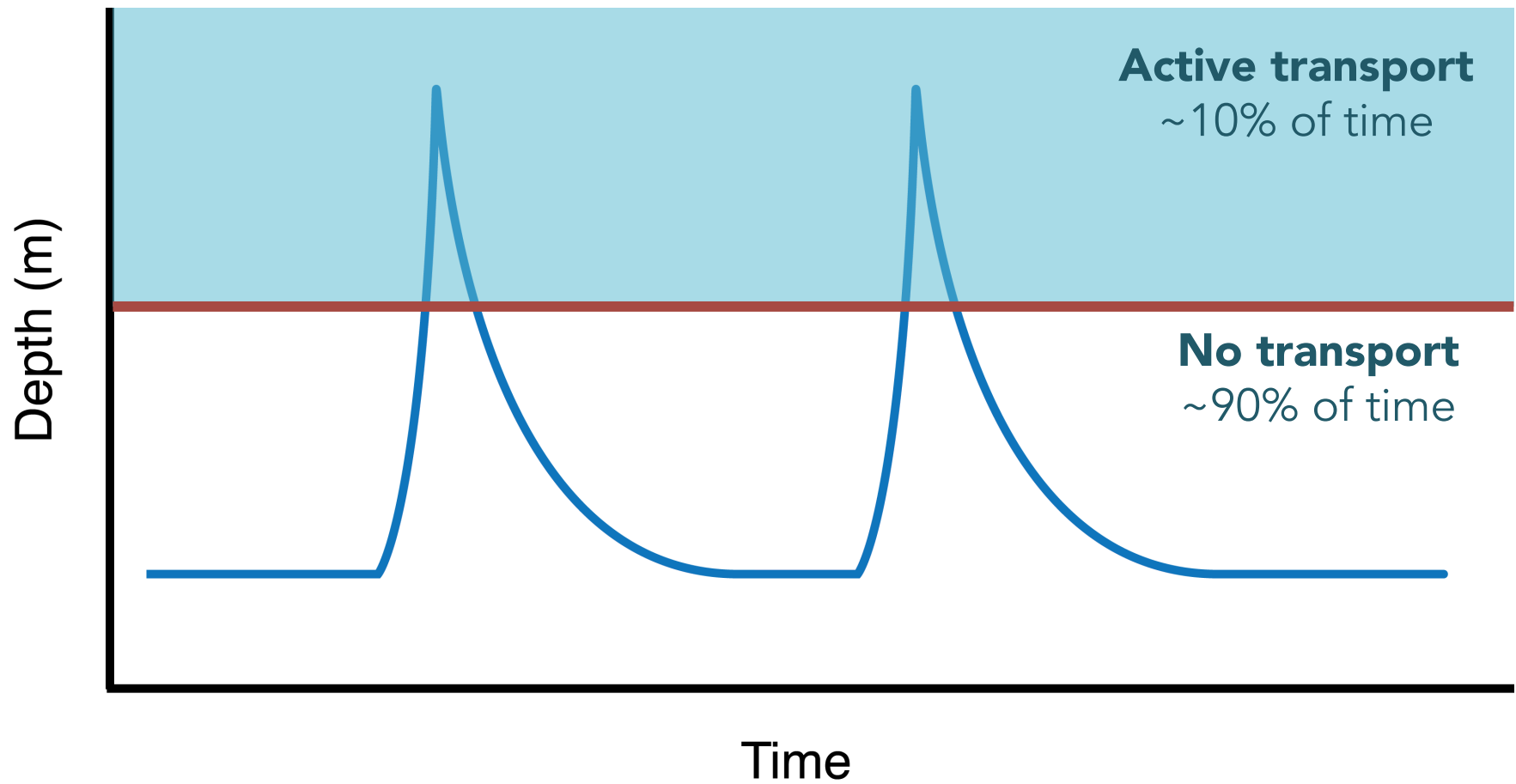
Current models for sediment transport are simple



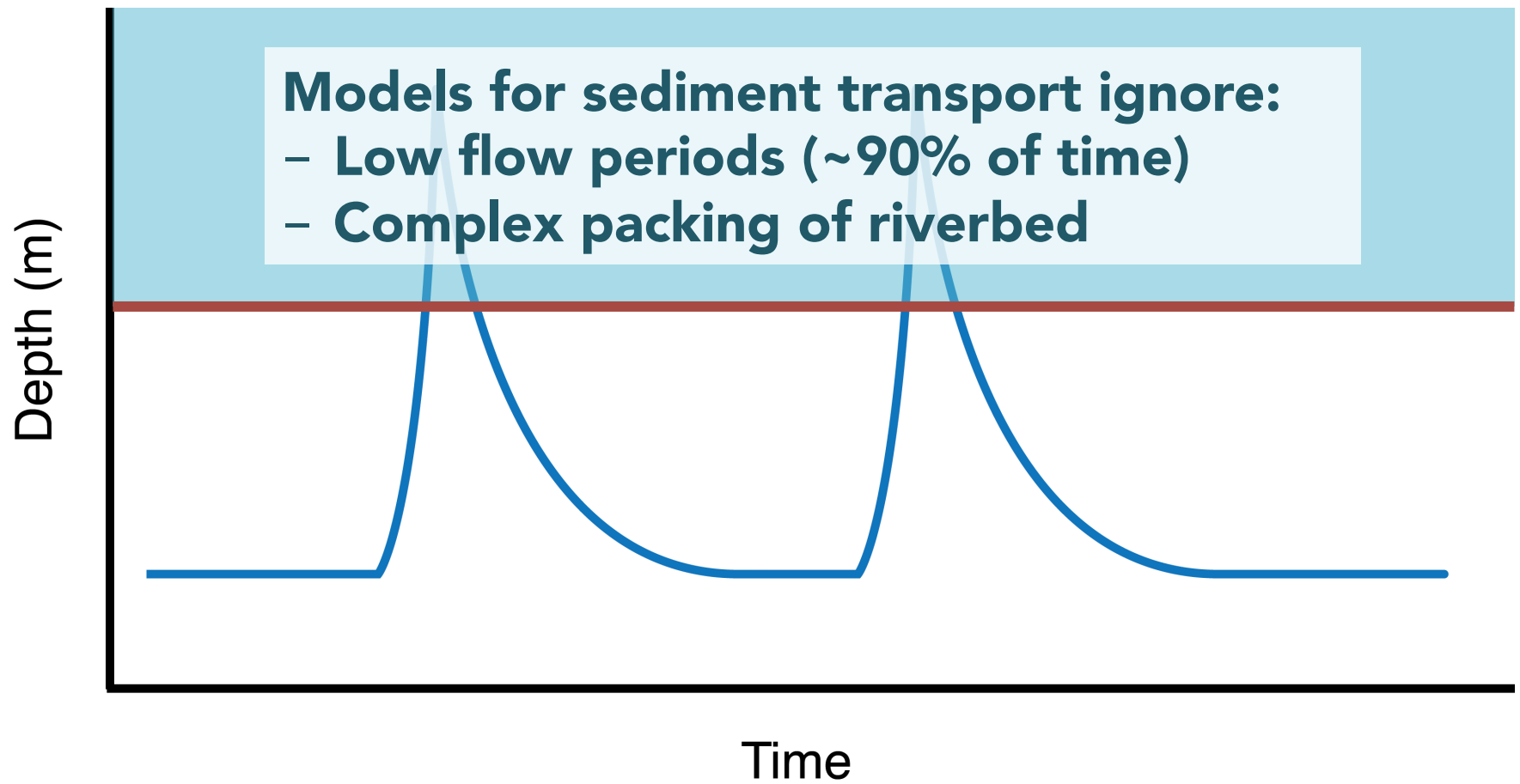
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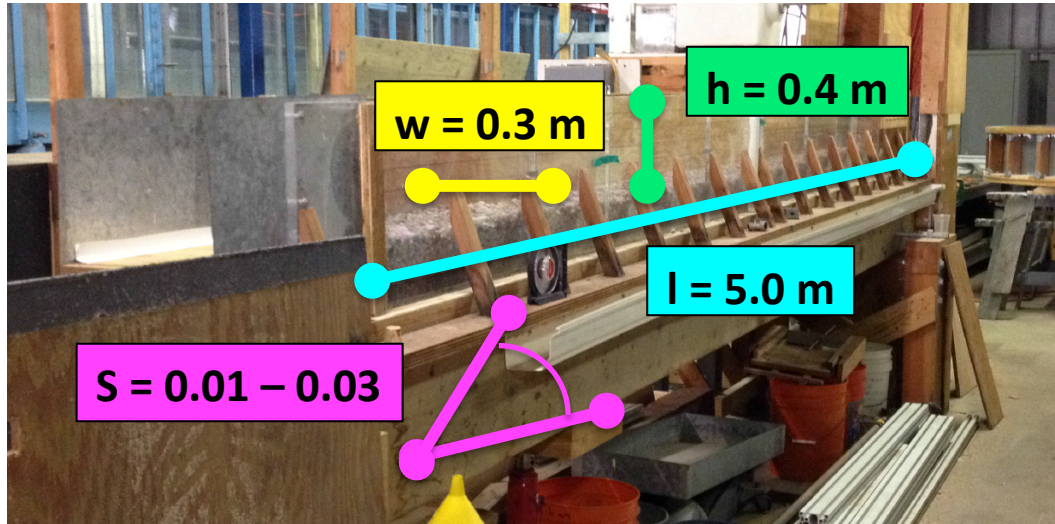
Current models for sediment transport are simple



How do low flow periods change bed topography & modify sediment transport rates?



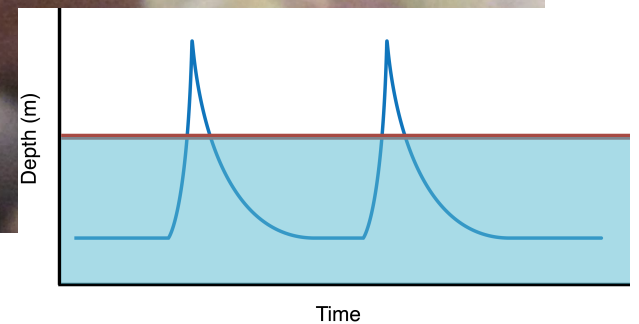
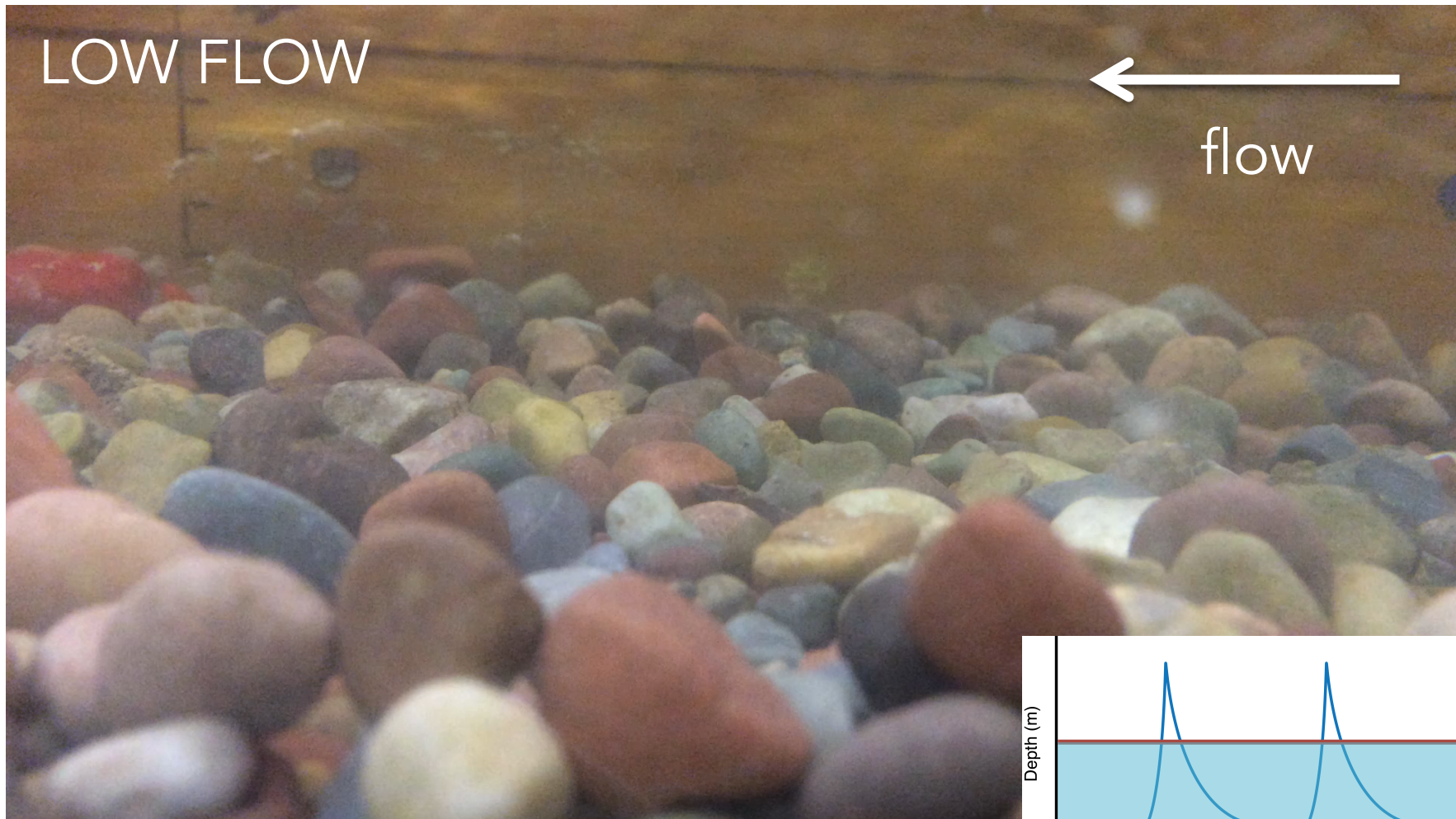
Flume experiments with variable low flow duration



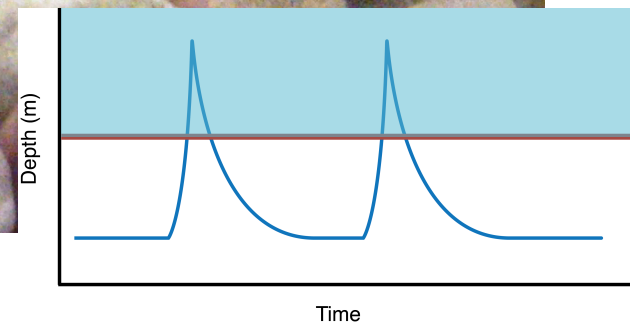
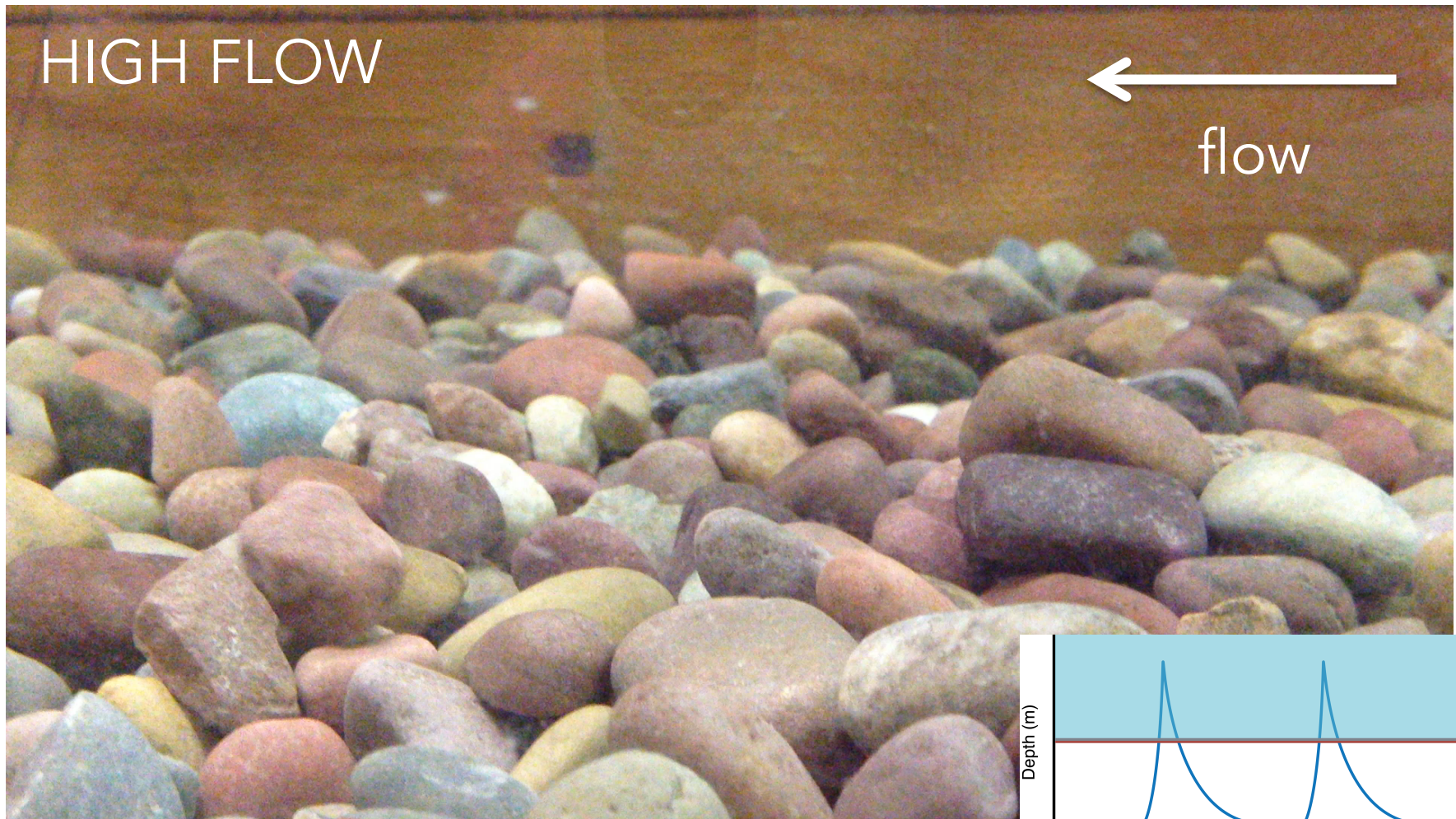
- Impose low flow for some time duration
- Measure sediment transport by catching sediment in basket & weighing it
- Measure changes in topography by constructing 3D models from digital photos



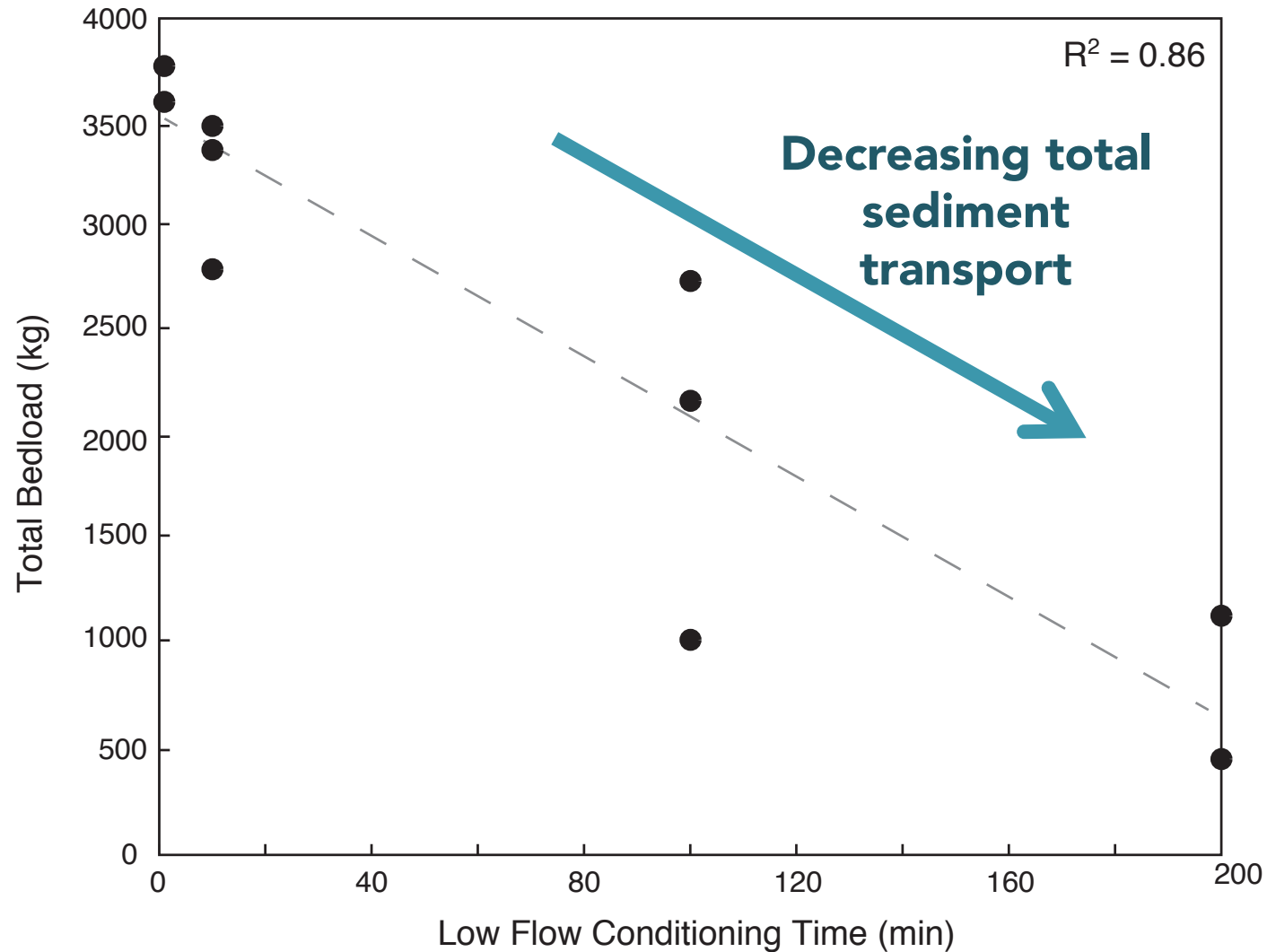
Flume experiments with variable low flow duration



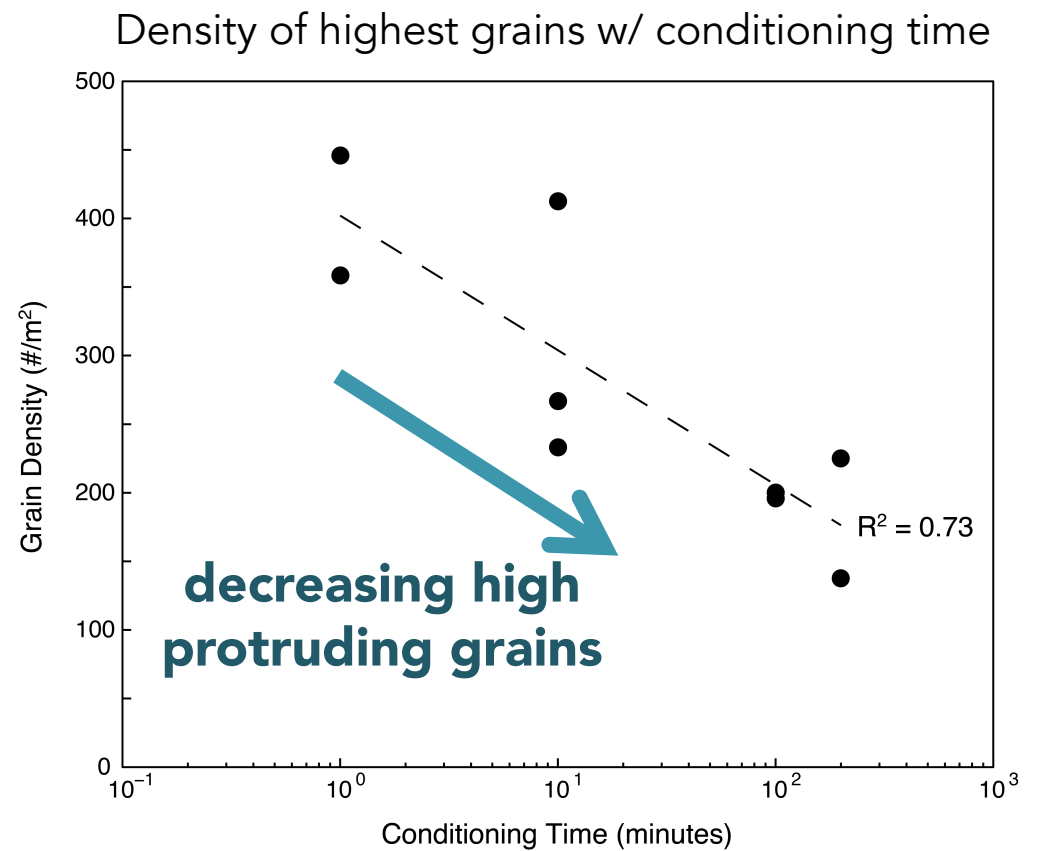
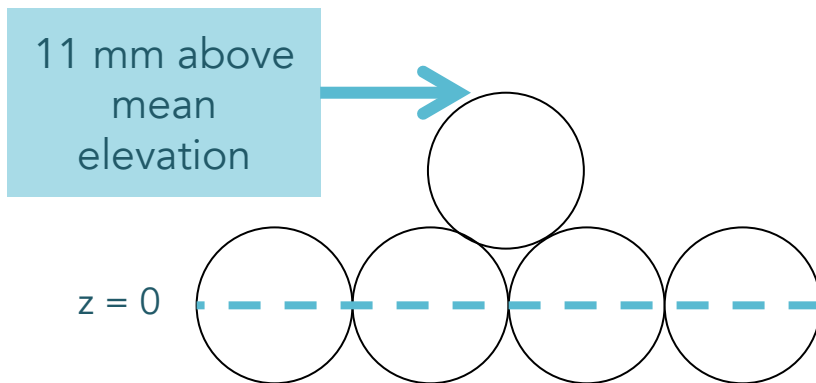
Flume experiments with variable low flow duration



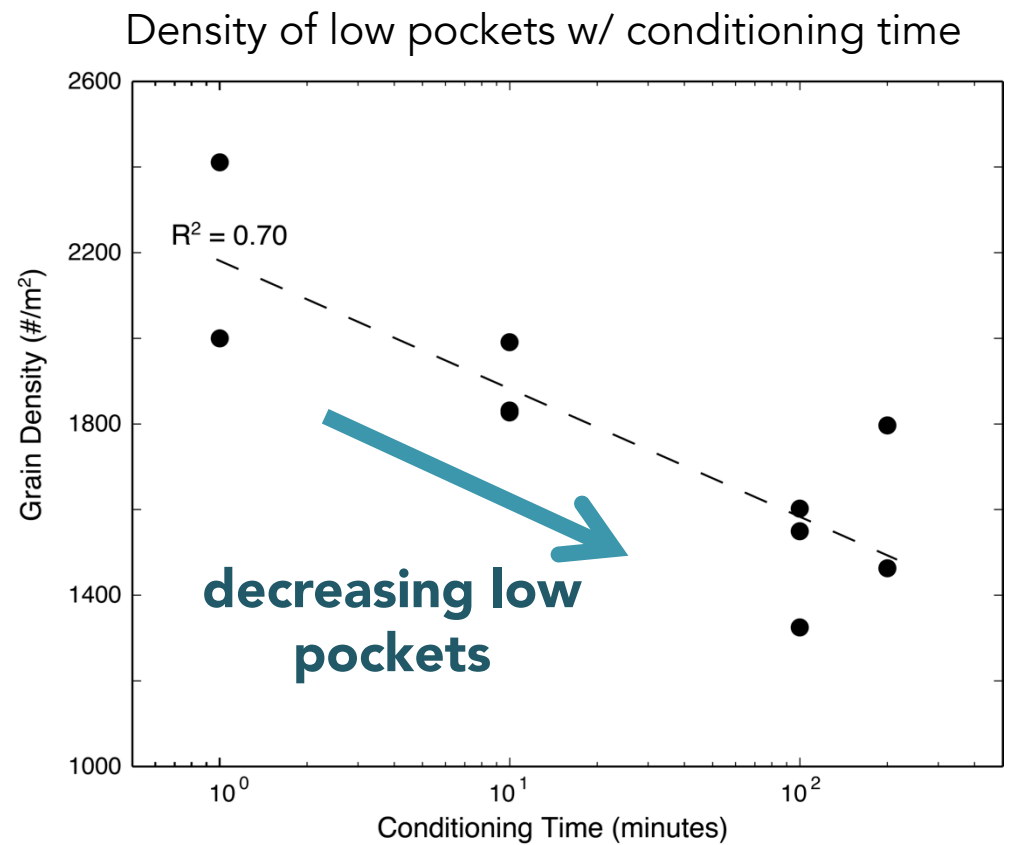
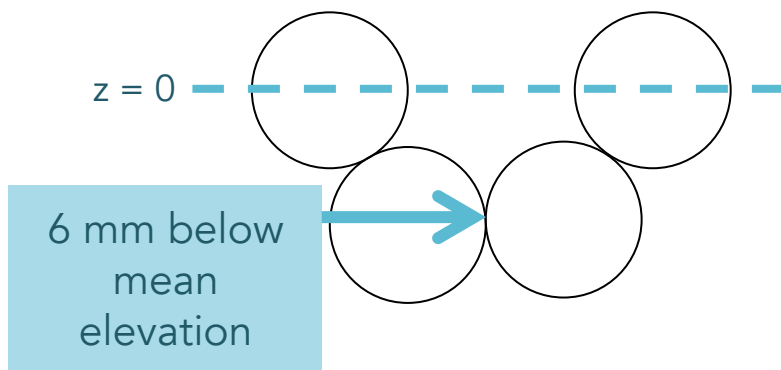
Increased low flow = Less transport



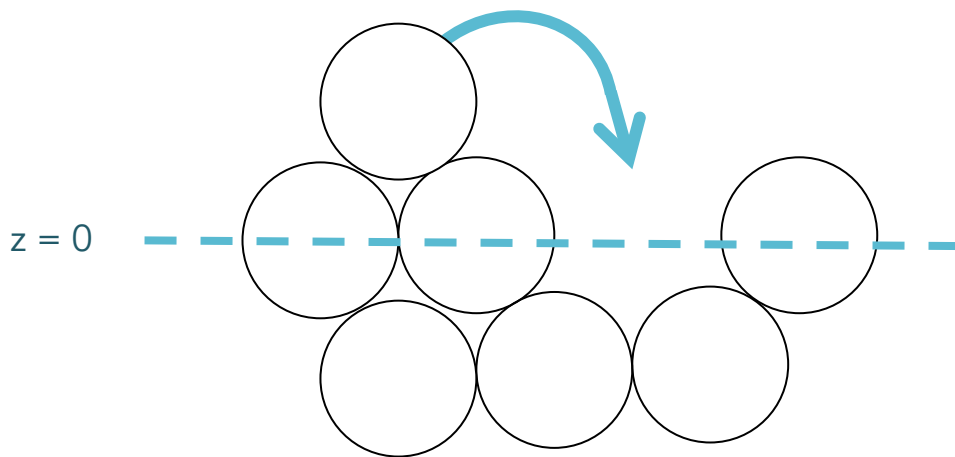
Longer low flow = Fewer high grains



Longer low flow = Fewer pockets

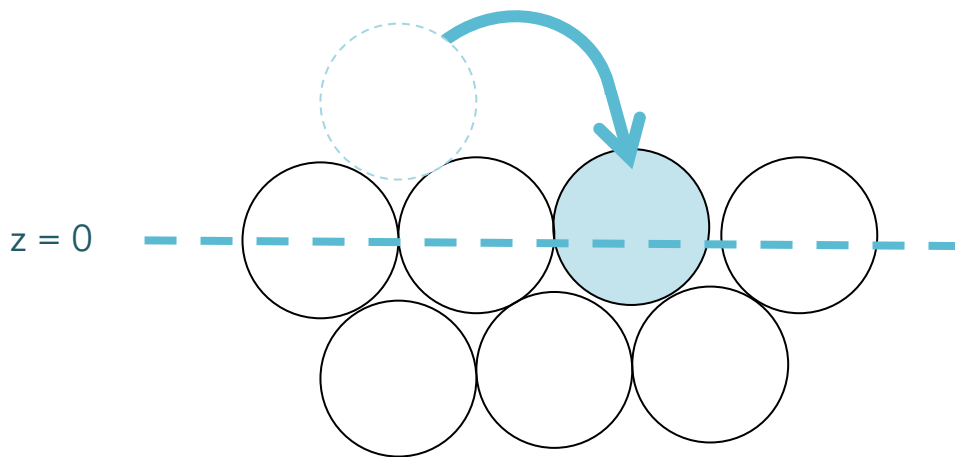


Low flow periods move highest grains into pockets



Increased conditioning time allows more grains to find nearby pockets

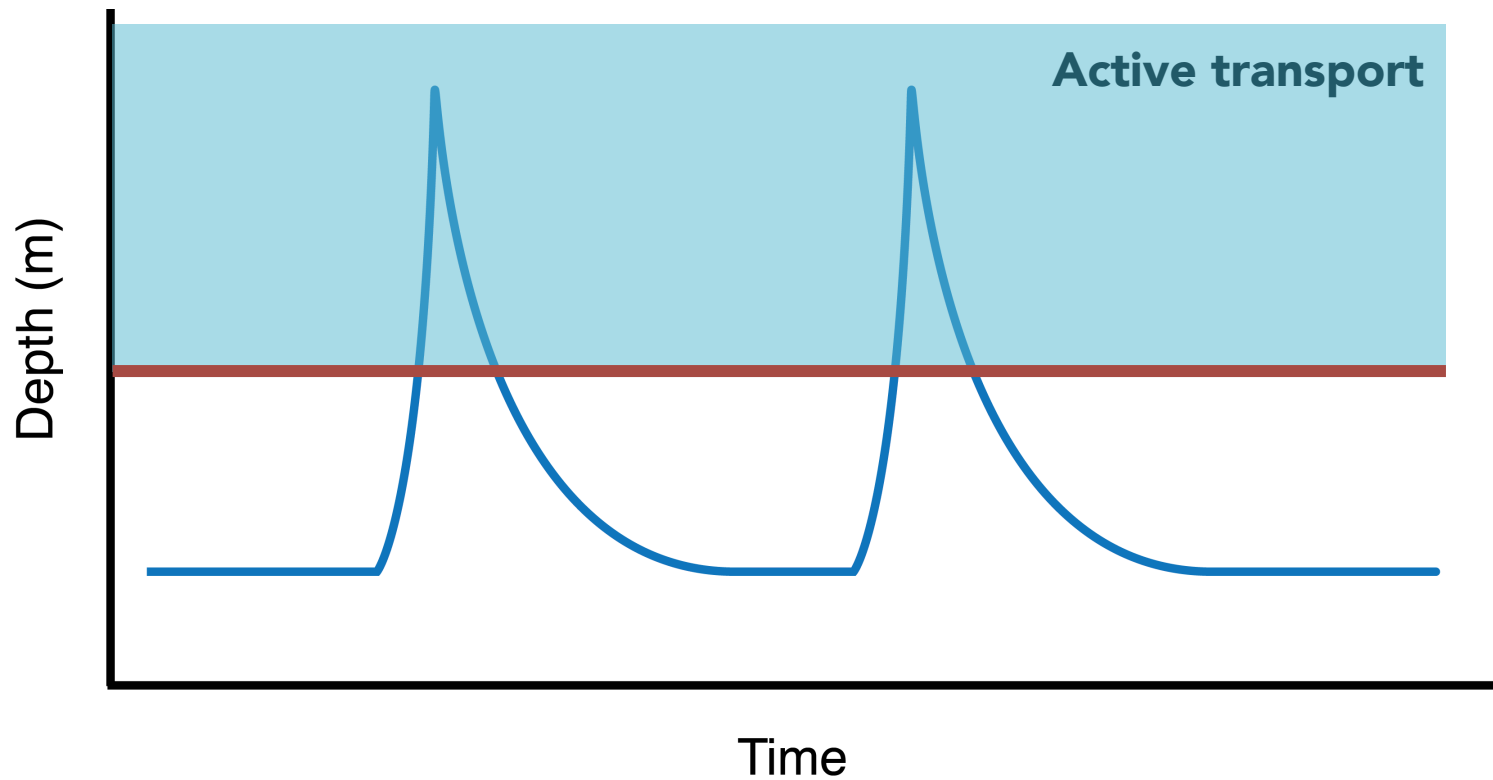
Low flow periods move highest grains into pockets



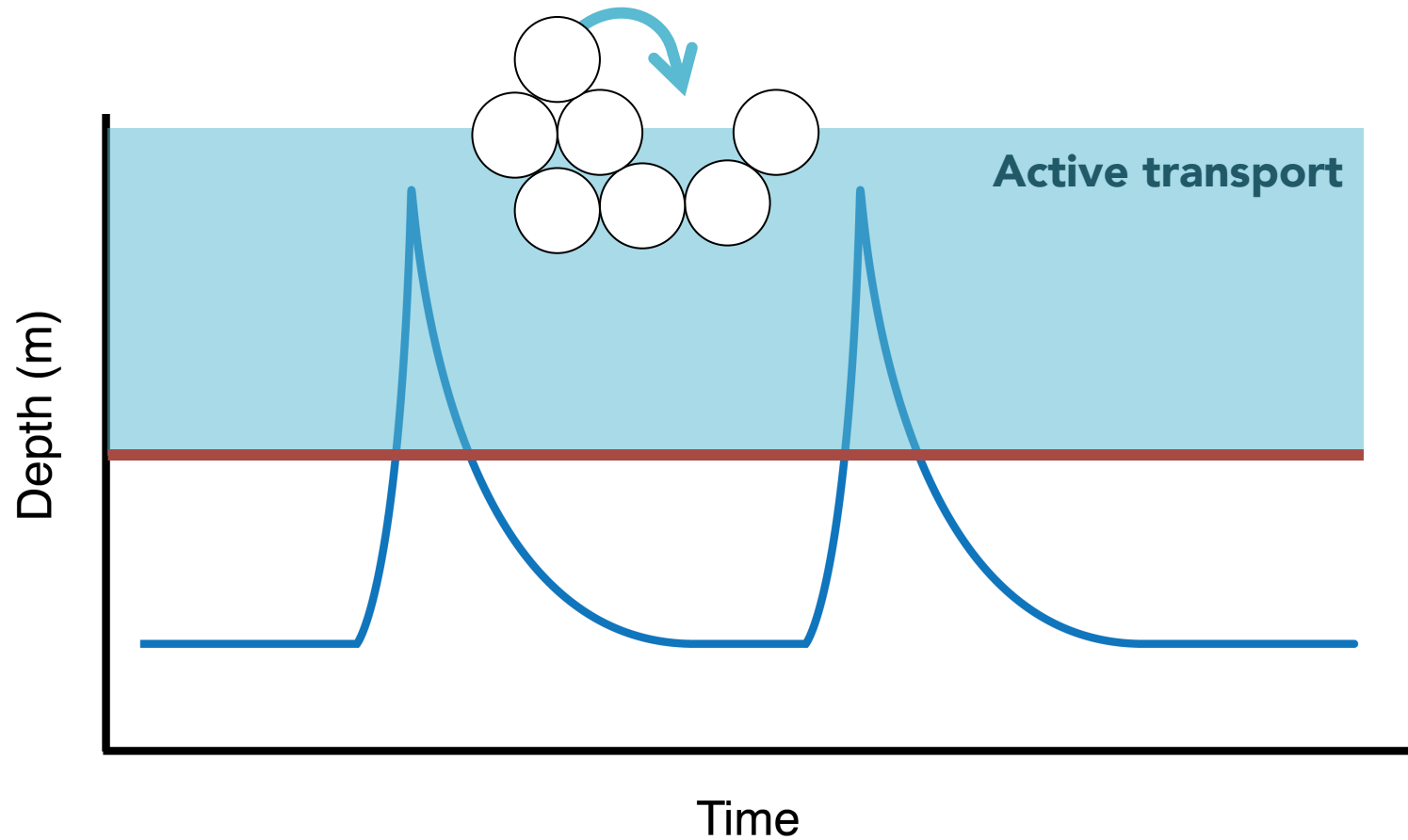
Increased conditioning time allows more grains to find nearby pockets

Grains are more stable in pockets, resulting in reduced sediment transport

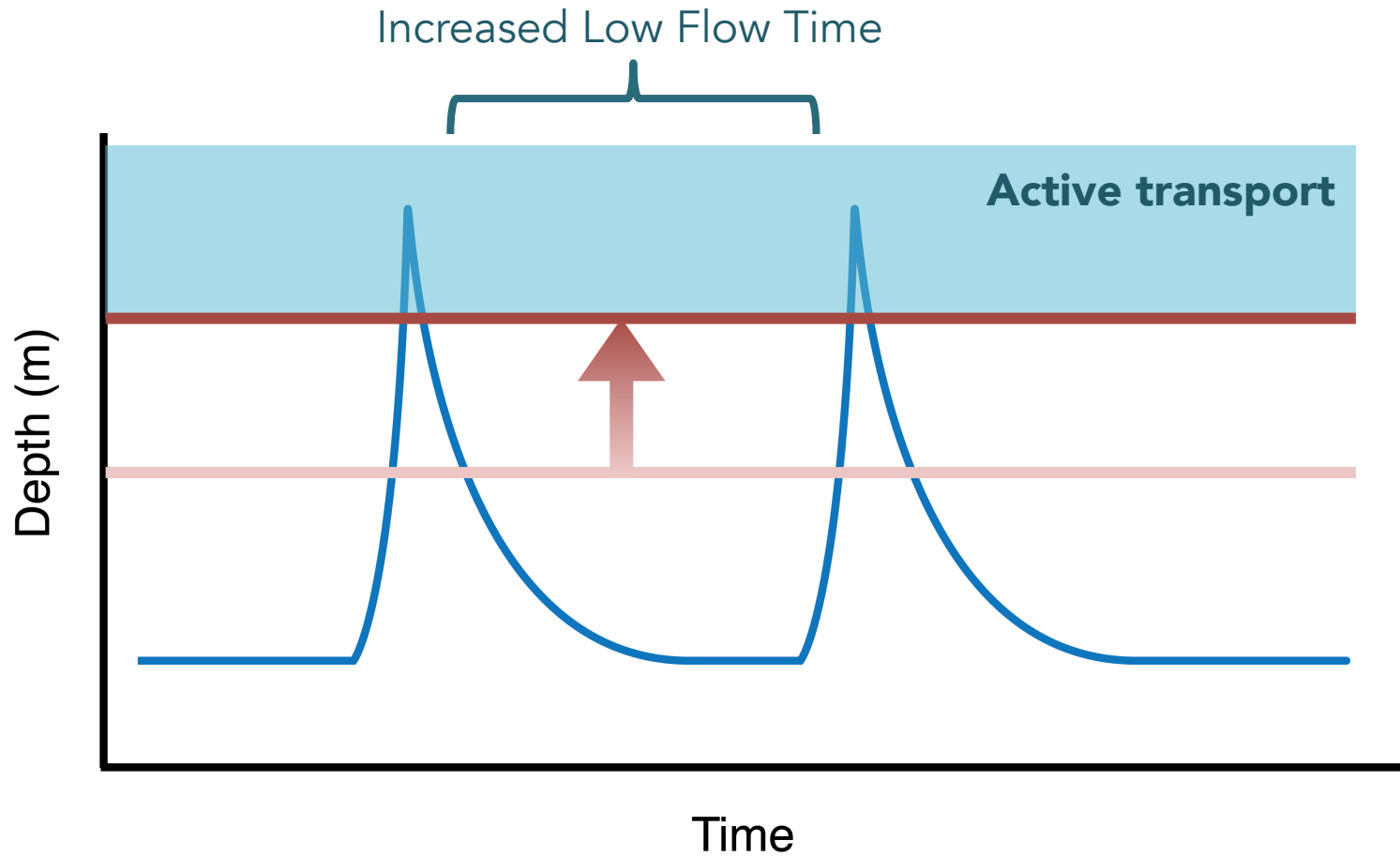
Revisiting the model for transport



Revisiting the model for transport



Revisiting the model for transport



Longer low flow → fewer high grains → less active transport

How do low flow periods change bed topography & modify sediment transport rates?



How do low flow periods change bed topography & modify sediment transport rates?



Longer duration of low flow decreases sediment mobility by number reducing high protruding grains

Highlights caveat of simple models to predict transport



Questions?



Thanks to: Christian Braudrick (UC Berkeley), Leonard Sklar (SF State), & Emily Brodsky (UCSC)

