For first time, meandering river created in laboratory

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Natural rivers are not straight, and they are rarely idle. Instead, they bend and curve and sometimes appear to wriggle across the surface over time. That rivers can meander is obvious but how and why they do so is less well known. These questions are complicated by the fact that researchers have for the most part been unable to realistically create a meandering river in a laboratory. Scientists have previously created simulated streams that bend and branch, but they were not able to limit the river to only a single main flow path or maintain such dynamic motion past the initial bend formation. Working with a 6-by-11 meter (20-by-36 foot) river simulator called the Eurotank, van Dijk et al. created a dynamically meandering river. In so doing, the authors identify two conditions necessary to induce meandering: the availability of mixed sediment and a continuously varying upstream water source.

For 260 hours the authors pumped a steady stream of water and mixed sediment onto a sediment-filled basin. First, they held the inflow point steady, which resulted in a straight channel. Then, they moved the inflow point horizontally, which caused the downstream flows to bend. Finally, the authors reversed the horizontal motion of the input point, which further increased the downstream complexity. Photographs taken every 10 minutes and high-resolution laser topography scans captured every 7 hours captured the details of the river's evolution.

The authors suggest that the drifting inflow point caused the channel to meander, while the presence of mixed sediments sealed off defunct paths, preventing the single channel from turning into a multithreaded

braided system. The finding suggests that meandering at any point in a river depends on lateral drift in upstream reaches, such that an immobile bottleneck at any one site will decrease downstream complexity.

More information: Experimental meandering river with chute cutoffs, *Journal of Geophysical Research-Earth Surface*, doi:10.1029/2011JF002314 , 2012

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