

BACK SCATTER

A satellite image showing a river delta where a river has split into two channels. The land is a patchwork of green and brown fields. The river channels are light blue, and the surrounding water is a deeper blue. The image is oriented vertically on the page.

Where rivers jump

The location of a streambed drifts over time as the water carried downstream erodes the surrounding land. Sometimes that gradual process is superseded by an avulsion—an abrupt jumping of the stream from one channel to another. Avulsions are rare, typically happening once every few decades at most, but they've been linked to historical floods. The consequences were devastating for civilizations that relied on the crops destroyed by those floods. This photo—from optical data collected by some of the European Space Agency's Sentinel satellites—shows the avulsion of the Pemali River in Indonesia. In 2006, almost 5 km upstream of the Java Sea, the river jumped from the longer right-hand path to the left-hand one.

Sam Brooke and Vamsi Ganti of the University of California, Santa Barbara, and their colleagues identified three categories of avulsions in a database they created from 50 years of global satellite imagery. The Pemali's jump falls into a category in which avulsions take place in a stream's delta and in a region known as the backwater zone, which is characterized by nonuniform flows. Although today's global supply chains better protect people from crop losses in a single location, avulsions can still threaten lives and property. Brooke, Ganti, and colleagues find that increasing flood frequency and sediment quantity, driven by climate change and people's engineering of the land surface, will affect avulsions. Their analysis offers a means to predict where they may occur in the future. (S. Brooke et al., *Science* **376**, 987, 2022; image courtesy of Sam Brooke and Vamsi Ganti.)

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