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# Slope control on the shape of bars in braided rivers: implication for paleoslope studies.

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Paleoslope is a parameter fundamentally needed if we are to invert paleohydrology and paleoclimate from the fluvial, understand the controls on aggradation and degradation in fluvial systems, and predict grain size and reservoir properties in hydrocarbon exploration and water resource management.
Braided rivers consist of multiple channels separating ephemeral bars at low water stage. While there seems to be no single universal mode of braid development, observation, physical experiments and numerical models all converge towards explaining bar formation as a result of excess bedload deposition at flow bifurcations and scour at convergences. Braiding thus can be viewed as the alongstream intertwinement of successive purely erosive dendritic convergent networks which dissect bar tops, and purely depositional bifurcating distributary systems which build the bars. The erosional convergent networks in braided rivers are often visible on aerial views when they have not yet completely dissected the surface of bars.
The form of incipient dendritic networks has been shown to depend on the slope of the surface on which water flows. Steep slopes develop elongated and narrower drainage networks, whereas gentle slopes produce more dilated and broader river basins.
Transposing this idea to braided rivers with dendritically dissected bar tops suggests that the elongation of bars may depend on the slope of the river.
The present paper uses data from 22 braided rivers and confirms partly the validity of this hypothesis. This provides a means of inverting the slope of ancient rivers as seen for example through the modern tools of 3D seismic geomorphology. The braided pattern of a fossil river in North-East China identified through cutting-edge seismic strata-slicing techniques is used here as an example of application to the evaluation of paleoslope from subsurface braid bar characterization. In addition, using empirical relationships between slope and grain size, this method provides a first-order prediction of grain size from subsurface information potentially useful in exploration.