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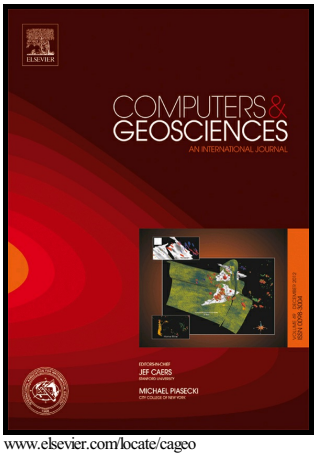

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Highlights

-We measure topographic anisotropy using directional dependent, multiscale variance calculations.

-Our method takes advantage of GPU acceleration through parallel CUDA code.

-Topographic anisotropy holds quantitative, spatially relevant information about past or present tectonic and surface processes conditions.

Keywords

Topography; anisotropy; variogram; GPU; tectonics; river incision

Abstract

We present the Every-Direction Variogram Analysis (EVA) method for quantifying orientation and scale dependence of topographic anisotropy to aid in differentiation of the fluvial and tectonic contributions to surface evolution. Using multi-directional variogram statistics to track the spatial persistence of elevation values across a landscape, we calculate anisotropy as a multiscale, direction-sensitive variance in elevation between two points on a surface. Tectonically derived topographic anisotropy is associated with the three-dimensional kinematic