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Multi-scale characterization of topographic anisotropy

S.G. Roy^{a*}, P.O. Koons^a, B. Osti^a, P. Upton^b, G.E. Tucker^c

^a *Earth and Climate Sciences, University of Maine, 111 Bryand Global Sci. Ctr., Orono ME 04469*

^b *GNS Science, PO Box 30368, Lower Hutt 5040, New Zealand*

^c *Cooperative Institute for Research in Environmental Sciences (CIRES) and Department of Geological Sciences, University of Colorado, UCB 399 Boulder, CO 80309-0399*

*Corresponding Author. Tel.: (207) 649-4787; E-mail address: Samuel.g.roy@umit.maine.edu

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

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