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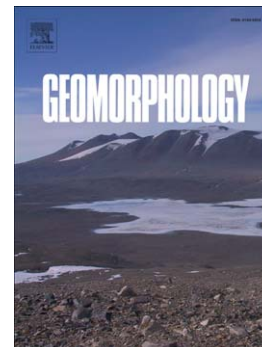
Excursions in fluvial (dis)continuity

Gordon E. Grant, Jim O'Connor, Elizabeth Safran

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Excursions in fluvial (dis)continuity

Gordon E. Grant*, Jim O'Connor, Elizabeth Safran

Dept, Oregon State University, Corvallis, OR zip, USA

*Corresponding author.

Abstract

Lurking below the twin concepts of connectivity and disconnectivity are their first, and in some ways, richer cousins: continuity and discontinuity. In this paper we explore how continuity and discontinuity represent fundamental and complementary perspectives in fluvial geomorphology, and how these perspectives inform and underlie our conceptions of connectivity in landscapes and rivers. We examine the historical roots of continuum and discontinuum thinking, and how much of our understanding of geomorphology rests on contrasting views of continuity and discontinuity. By continuum thinking we refer to a conception of geomorphic processes as well as geomorphic features that are expressed along continuous gradients without abrupt changes, transitions, or thresholds. Balance of forces, graded streams, and hydraulic geometry are all examples of this perspective. The continuum view has played a prominent role in diverse disciplinary fields, including ecology, paleontology, and evolutionary biology, in large part because it allows us to treat complex phenomena as orderly progressions and invoke or assume equilibrium processes that introduce order and prediction into our sciences.

In contrast the discontinuous view is a distinct though complementary conceptual framework that incorporates non-uniform, non-progressive, and non-equilibrium thinking into understanding geomorphic processes and landscapes. We distinguish and discuss examples of three different ways in which discontinuous thinking can be expressed: 1) discontinuous spatial arrangements or singular events; 2) specific process domains generally associated with thresholds, either intrinsic or extrinsic; and 3) physical dynamics or changes in state, again often threshold-linked. In moving beyond the continuous perspective, a fertile set of ideas come into focus: thresholds, non-equilibrium states, heterogeneity, catastrophe. The range of phenomena that are thereby opened up to scientific exploration similarly expands: punctuated episodes of cutting and filling, discretization of landscapes into hierarchies of structure and control, the work of extreme events. Orderly and progressive evolution towards a steady or ideal state is replaced by chaotic episodes of disturbance and recovery. Recent developments in the

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