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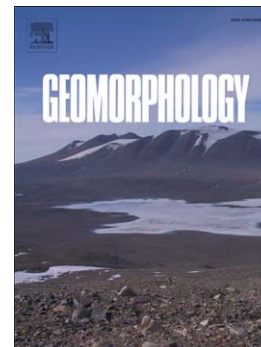
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Fang Yu, Allen Gerhard Hunt

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Predicting Soil Formation on the Basis of Transport-Limited Chemical Weathering

Fang Yu^a, Allen Gerhard Hunt^{a,b}

a. Department of Earth & Environmental Science, Wright State University, 3640 Colonel Glenn Highway, Dayton, Ohio.

b. Department of Physics, and Department of Earth & Environmental Science, Wright State University, 3640 Colonel Glenn Highway, Dayton, Ohio.

Email: yu.39@wright.edu; allen.hunt@wright.edu

Abstract

Soil production is closely related to chemical weathering. It has been shown that, under the assumption that chemical weathering is limited by solute transport, the process of soil production is predictable. However, solute transport in soil cannot be described by Gaussian transport. In this paper, we propose an approach based on percolation theory describing non-Gaussian transport of solute to predict soil formation (the net production of soil) by considering both soil production from chemical weathering and removal of soil from erosion. Our prediction shows agreement with observed soil depths in the field. Theoretical soil formation rates are also compared with published rates predicted using soil age-profile thickness (SAST) method. Our formulation can be incorporated directly into landscape evolution models on a point-to-point basis as long as such models account for surface water

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