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Enhancement of bedrock permeability by weathering

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Abstract

The permeability of bedrock aquifers varies by more than four orders of magnitude between different lithologies, but the reasons for this large range remain unexplained. In this review, we examine the role that weathering plays in enhancing the permeability of the five major hydrolithologies, represented by limestone, basalt, granite, sandstone and shale. In limestone aquifers, rapid dissolution kinetics and congruent dissolution result in widespread permeability enhancement. Weathering is usually focused along fractures, and feedbacks between flow and dissolution result in self-organization into networks of channels that discharge at springs. Caves represent prominent examples of weathering. In silicate aquifers, slower dissolution kinetics and incongruent dissolution make it more difficult to predict permeability enhancement. However, positive correlations between permeability and both the solute

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