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# The search for an optimal subsurface representation in soil-landscape models

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Soil-landscape models resolve the physical landscape in three dimensions: two lateral dimensions and the vertical dimension. Typically, geomorphic processes operate over the two lateral dimensions and affect the top of the vertical dimension, whereas pedological processes operate vertically and affect the entire vertical dimension. Hence, in all present soil-landscape models, interactions between geomorphic processes and pedological processes occur through the top of the vertical dimension.
As a result of this, it is crucial to find an optimal representation of the vertical dimension (i.e. the subsurface) in the digital landscape. Soil-landscape models differ in this respect, but no evaluation of the various choices has yet been performed. This evaluation, and the search for an optimal representation, has been the objective of the current study. I first defined criteria for an optimal subsurface representation. The first criterion is that the optimal representation should capture more detail where the subsurface varies over shorter distances – typically near the surface. Second, the optimal representation uses as little computer memory as possible. Third, it avoids information loss as soil and other subsurface material changes over time and erosion or deposition change the surface level. Existing representations of the vertical dimension are discussed using these three criteria and a suggestion for an optimal representation is made.