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Quantifying soil complexity using network models of soil porous structure

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Over the last decade, network theory has become a much discussed cross-disciplinary research field contributing to social, biological and information sciences [1], demonstrating that quite diverse systems might share similar topological organization.
One of great challenges in soil science today is to understand soil as a complex system [2]. Two approaches to describe soil pore structure as complex networks of pores have recently been used [3,4] both emphasizing the role of spatial embedding of the network and showing that heterogeneous soil pore size distribution leads to scale-free topology of the complex pore networks.
Here, we further investigate the properties of spatially embedded complex networks representing the soil pore architecture and suggest an approach to quantify the complexity of soil pore structure based on the node-node link correlation properties of the networks. We show that the complexity depends on the strentgh of spatial embedding of the network and that this is related to the transition from a non-compact to compact phase of the network.

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