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Fractal geometry and soil systems: Overview and operational challenges

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In the last 25 years, since the publication by Mandelbrot of his landmark book entitled “The fractal geometry of nature”, fractal geometry has been applied frequently to describe soil systems, using a variety of approaches. In this presentation, following a very short description of the principles of fractal geometry, I try to sum up what this mathematical theory has contributed to our collective understanding of soils. I argue that the two major contributions of fractal geometry have been (1) a re-framing of the research on soil structure, away from a simplistic consideration of largely artificial “aggregates”, and (2) a conceptualization of soil properties, including their fractal dimensions, as dependent on observation (measurement) scale. This second contribution has come about as a consequence of operational difficulties encountered when applying fractal principles to soils, and for which there does not seem to be any easy solution. Prospects for the future are discussed.