

Automation of a falling head permeameter assessing spatial variability of hydraulic conductivity.

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Abstract:

It is well known that soils vary over a given landscape, and this variability includes soil physical properties such as hydraulic conductivity. We have initiated a study to develop a better understanding of spatial variability of soil hydraulic properties in both horizontal and vertical directions. Initially we focused on hydraulic conductivity of saturated soil (Ks) by horizons. *In Situ* Ks measurements made in the Ap, A, Bt, and till horizons with an Amoozemeter showed significant difference between horizons. The 2 ha study area consisted of three soil types. Further sampling was done with soil cores, and in order to accommodate the large number of samples, we developed an automated falling head permeameter with a pressure transducer attached to the base to measure Ks of soil cores in the laboratory. Sixty soil core samples were taken from two other sites, 30 from a sand and 30 from a silt loam. The Ks values from the sand ranged from 1.02×10^{-5} to 2.78×10^{-6} cm sec⁻¹, and values from the silt loam ranged from 2.78×10^{-7} to 2.48×10^{-8} cm sec⁻¹ using the automated method. When values obtained using the automated method were compared to values obtained for the same cores using the conventional technique, there were no statistical differences at the 95% level.

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