



Can we infer final infiltration rates from comparatively short infiltrometer measurements?

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The measurement of infiltration, a key hydrologic process, often requires a substantial amount of time and effort before a data set is obtained that adequately covers both spatial and temporal variation of infiltration rates in a catchment or even on a hillslope. In practical field work, it is, therefore, frequently of considerable value to know, how long an infiltration measurement needs to continue before an estimate of the final infiltration rate can be made with confidence. The work reported here is based on double ring infiltrometer measurements of up to three hours' duration. The data sets thus obtained are used to estimate the final infiltration rate by repeated application of a Green-Ampt type infiltration model. A least squares criterion is used to calibrate the two parameter model and to determine the final infiltration rate associated with the best fit of computed and measured infiltration rates. By truncation of the complete data sets available, time series of varying lengths were employed in this estimation procedure to find out what the minimum length of a data set is that permits the 'optimized' final infiltration rate to be obtained with confidence. Double ring infiltrometer measurements were performed at several different sites, with the resulting data sets evaluated in the way described above.

The work reported here indicates that measurements as short as 15 min to 30 min may suffice to produce data sets that permit final infiltration rates to be estimated with confidence, resulting in 'best fit' values that experience little further change as the measuring interval is increased. For these very short measurement durations mentioned it was found important to keep the interval between individual readings short, i.e. of the order of 30 s. It is expected that future extensions to the data base will permit a more precise picture to be drawn with respect to the relationship between soil (layer) properties and required measurement duration.