



Experimental shortcomings and applicability of in-situ ponded infiltration tests

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Ponded infiltration experiments are usually performed in an ad hoc grid of measurement points with a regular or random layout. At the end of the measurement campaign, the measurement grid is dismantled. Such experimental design allows for the basic evaluation of spatial variability of the soil infiltrability, however, to examine the temporal component of the overall variability of soil infiltration properties, the measurement campaign needs to be repeated at different times (e.g. different seasons of a year or the same season of different years). Reestablishing the measurement grid exactly into the same measurement positions can be very difficult, especially in structured soils. At such circumstances, a permanent grid of ring infiltrometers seems to be a viable option.

In 2003, 18 permanent infiltration rings were installed at a mountain meadow site Liz (Bohemian Forest, Czech Republic). Since then, ponded infiltration experiments were conducted annually. The study was aimed to evaluate the spatial and temporal variability of the soil infiltrability.

When only initial four years are analyzed, the temporal variability of the infiltration rates in individual rings is generally less than the spatial variability among the rings in individual years. In later years, the spatial variability of the infiltration rates was overridden by interannual changes. The shift toward higher infiltration rates generally corresponds to the development of the weather conditions encountered during the years of study (extremely wet year 2002 and exceptionally dry year 2015). The excessive infiltration rates encountered in later years together with the contrasting results obtained in temporally installed rings indicate that the results were affected by local soil changes at the tested spots that were directly or indirectly induced by the experimental procedure. The observed infiltration rates could be influenced by the volumetric changes of the installed plastic infiltration rings or by the large amount of water infiltrated during the experiments. Also, the local periodical wetting of the soil together with the permanent presence of the infiltration rings could affect distribution of burrowing animals' activity, with serious consequences for the infiltration rates measured.