



Can we revisit Perrault's experiments?

Stefano Barontini, Maria Grottole, and Roberto Ranzi

Università di Brescia, DICATAM, Brescia, Italy (barontin@ing.unibs.it, +39 030 371 1293)

In his classical book about the origin of springs, published in 1674, Pierre Perrault describes some sets of experiences which he performed with the aim of understanding the soil and the rainfall role in the hydrological cycle. In order to investigate (*i*) whether the water could spontaneously rise within the soil and originate springs, and (*ii*) how the rainfall could percolate through the soil and recharge the groundwater, he filled with different soils an empty pipe, 65 cm long, and observed their performances against capillary rise, infiltration, percolation and water-content redistribution. His conclusions went in the direction of the ancient opinion, but the report is very modern and it is still considered one of the seminal works of the experimental soil hydrology. Most of the details are in fact precisely described and some of them are also quantitatively provided.

With the aim of deepening the knowledge of Perrault's experiences, their numerical repeatability was discussed in the framework of a water flow conceptualisation based on the Richards equation. Then the richest one in quantitative details was re-analysed. As a result of the deductions inferred from the data and of the inverse simulations, estimates of the hydraulic properties of Perrault's soil are provided.