



A Local Vision on Soil Hydrology (John Dalton Medal Lecture)

K. Roth

Heidelberg University, Institute of Environmental Physics, Germany

After shortly looking back to some research trails of the past decades, and touching on the role of soils in our environmental machinery, a vision on the future of soil hydrology is offered. It is local in the sense of being based on limited experience as well as in the sense of focussing on local spatial scales, from 1 m to 1 km.

Cornerstones of this vision are (i) rapid developments of quantitative observation technology, illustrated with the example of ground-penetrating radar (GPR), and (ii) the availability of ever more powerful compute facilities which allow to simulate increasingly complicated model representations in unprecedented detail. Together, they open a powerful and flexible approach to the quantitative understanding of soil hydrology where two lines are fitted: (i) potentially diverse measurements of the system of interest and their analysis and (ii) a comprehensive model representation, including architecture, material properties, forcings, and potentially unknown aspects, together with the same analysis as for (i). This approach pushes traditional inversion to operate on analyses, not on the underlying state variables, and to become flexible with respect to architecture and unknown aspects. The approach will be demonstrated for simple situations at test sites.