Measuring and modelling vectors of subsurface flow in a hillslope

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In a previous assessment, we focused on the measurement of in-situ flow vectors in a hillslope soil, based on the passing of wetting fronts. We selected a 100 m^2 trenched hillslope study site. During prescribed sprinkling, an obliquely installed TDR waveguide measured the velocity of the wetting front in its direction. A triplet of waveguides mounted along the sides of a hypothetical tetrahedron, with its peak pointing down, produced a three-dimensional vector of the wetting front. We analysed 34 vectors along the hillslope at distributed locations and at soil depths from 11 cm (representing top soil) to 40 cm (close to bedrock interface).

In a further step, we setup and parameterised the ESTEL model to the trenched hillslope study side. ESTEL is a finite element variably saturated flow model, and has been used in several cases to look at the complex 3D flows between hillslope, floodplain and river channel.