

LadHyX Seminar – February 6th, 10:45

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How groundwater responds to rainfall

The ground beneath our feet forms a porous matrix of permeable soil and rock, known as “aquifer”. When it rains, water infiltrates into the ground and accumulates in the aquifer, inducing a pressure gradient that pushes groundwater towards the neighboring stream. Viscous friction, however, delays this transfer. Part of the rainwater thus accumulates temporarily in the aquifer so that the groundwater free surface — the water table — bulges and rises above the river level. Once the rain has stopped, the aquifer gradually releases this excess water into the stream. As a result, the latter continues to flow until the water table relaxes to its equilibrium shape, a horizontal surface leveled with the river. Through this ability to store and release water according to its own dynamics, the aquifer acts as a filter between the rainfall signal and the flow of water into the stream. A combination of laboratory experiments, mathematical analysis, and field observations allows us to understand this filtering process, and to predict the shape of floods.