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A solute leaching experiment to measure the spatio-temporal distribution of a bromide pulse and a chloride block irrigation on a loamy vineyard soil

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Soil heterogeneity, fingered flow and macropore flow cause solutes to spread out in time and space as they move downwards from the soil surface with infiltrating water. Temporal solute spreading is characterized by the breakthrough curve (BTC), which describes the travel time distribution of solutes at a given depth. The spatial solute spreading is characterized by the spatial solute distribution curve (SSDC) that is the spatial equivalent of the BTC. Combining the BTC and the SSDC gives the leaching surface. The leaching surface thus describes both the spatial and the temporal redistribution of uniformly applied solutes at a given depth.

Solute monitoring is often limited to observations of resident concentrations, while flux concentrations govern the movement of solutes in soils. We developed a new multi-compartment sampler, capable of measuring fluxes at a high spatial resolution. The sampler contained 100 separate cells of 31 by 31 mm. Water fluxes are measured every 5 minutes for each cell.

We performed a solute leaching experiment on a collected loamy soil block from a vineyard in Great Western, Australia. We irrigated under controlled conditions an annual cycle of wastewater irrigation during the growing season (summer) and rainfall during winter. One of the ions of the wastewater irrigation block was chloride. During the first irrigation of the summer period we applied a bromide pulse. We monitored leaching of bromide and chloride by frequently extracting the collected leachate.

We will present preliminary experimental results, including time series of the percola-

tion fluxes. The bromide and chloride leaching will be analyzed by means of leaching surfaces.