



## **Solute flux and concentration monitoring in the vadose zone using Passive Capillary Wick Samplers (PCAPS)**

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Field measurements of the water flux and associated nutrient or contaminant concentrations in the vadose zone of agricultural fields are rarely available. The main reason is the difficulty of capturing the natural soil water flux. The paper discusses the design, installation and preliminary evaluation of Passive Capillary Wick Samplers (PCAPS). PCAPS are cheap and simple sampling instruments capable of sampling the percolating soil solution, using the passive capillary properties of fiberglass wicks in direct contact with the soil. Prior to field installation, an axi-symmetrical 3D model study was conducted to analyze the optimal layout (i.e. sampler geometry, wick type, wick length and number of wicks) of the PCWS. Sixteen PCAPS were installed around a 16 m long and 2.5 m deep trench at 45 cm below surface. The PCAPS are equipped with tensiometers for comparison of the soil tension above the sampling systems ('sampling' tension) with the 'reference' tension in the adjacent undisturbed soil. It is shown that reference and sampling tensions differ within an acceptable range. To allow parameterization of unsaturated zone solute transport models, soil moisture content is measured using TDRs and soil temperature using thermocouples. A drop counter is installed at the outlet of each of the PCAPS making hourly measurements of the percolated volumes under real field conditions possible. It is shown that PCWS are capable of capturing the temporal variation of the quantity and quality of leachate in the unsaturated zone. The experimental set-up was developed within the frame of a field experiment investigating the impact of Dissolved Organic Carbon (DOC) facilitated contaminant transport through the vadose zone. The experiment should aid in evalu-

ating the effect of four different treatments on the DOC associated leaching of copper and pesticides: (i) conventional tillage, (ii) reduced tillage, (iii) grey water irrigation and (iv) pig manure application. The equipment is now 5 months in operation and DOC concentrations vary between 4.2 and 28.6 mg C/l with an average value of 10.7 mg C/l.