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Characterization and cartography of topsoil hydraulic properties in a French mountainous peri-urban catchment

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Due to the increase of urbanization and modification of agricultural practices, peri-urban areas experiment a quick change in land use. The impact of such change on the catchment hydrological cycle must be quantified. To achieve this goal, distributed hydrological models offer the ability to take into account land use change, and more specifically its effect on surface infiltration capacity. A distributed assessment of infiltration properties and their variability at the catchment scale is thus of great importance if accurate simulation of the water balance are expected on such catchments.

This paper presents a field campaign conducted in a 7 km² peri-urban catchment, located in the “Mont du Lyonnais” area, close to the city of Lyon (France) in order to document the topsoil hydraulic properties. The sampling strategy was set up in order to sample the largest number of soil/land use combinations. The locations were chosen from a GIS analysis based on the overlapping of the pedology and land use maps, and accessibility consideration. At each location, two types of infiltration tests were performed: infiltration tests under suction using mini-disk infiltrometers and single ring infiltration tests under positive head. Three replicates were performed for each method. Particle size data and organic matter analysis were also conducted at each location.

Results will be discussed in terms of soil hydraulic properties and particle size data statistics. Relationship with external factors such as pedological unit, land use, slope, texture will be explored. Preliminary results show that forest and pasture soils exhibit the highest hydraulic conductivity and sorptivity.

In order to provide models with values at the modelling unit scale (field and/or sub-catchment scale), existing pedotransfer function will be assessed and if necessary calibrated using the local measurements. Finally a methodology for the cartography of the soil hydraulic properties will be proposed.