



A method for mapping topsoil field-saturated hydraulic conductivity in the Cévennes-Vivarais region using infiltration tests conducted with different techniques

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Topsoil field-saturated hydraulic conductivity, K_{fs} , is a parameter that controls the partition of rainfall between infiltration and runoff. It is a key parameter in most distributed hydrological models. However, there is a mismatch between the scale of local in situ measurements and the scale at which the parameter is required in models. Therefore it is necessary to design methods to regionally map this parameter at the model scale. The paper propose a method for mapping K_{fs} in the Cévennes-Vivarais region, south-east France, using more easily available GIS data: geology and land cover.

The mapping is based on a data set gathering infiltration tests performed in the area or close to it for more than ten years. The data set is composed of infiltration tests performed using various techniques: Guelph permeameter, double ring and single ring infiltration tests, infiltrometers with multiple suctions. The different methods lead to different orders of magnitude for K_{fs} rendering the pooling of all the data challenging. Therefore, a method is first proposed to pool the data from the different infiltration methods, leading to a homogenized set of K_{fs} , based on an equivalent double ring/tension disk infiltration value. Statistical tests showed significant differences in distributions among different geologies and land covers. Thus those variables were retained as proxy for mapping K_{fs} at the regional scale. This map was compared to a map based on the Rawls and Brakensiek (RB) pedo-transfer function (Manus et al., 2009, Vannier et al., 2016), showing very different patterns between both maps. In addition, RB values did not fit observed values at the plot scale, highlighting that soil texture only is not a good predictor of K_{fs} .

References

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