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Simplified method to derive a pedotransfer function for average field saturated hydraulic conductivity with limited data-set

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Saturated hydraulic conductivity, K_s, is highly variable in space. It exhibits seasonal variability (Bormann and Klaassen 2008), scale dependency with regards to the volume of soil investigated (Lai and Ren 2007) and its value is affected by the measurement technique used for *in-situ* exploration (Morbidelli et al. 2017).

Measurements of K_s were performed in the Hydrological Open Air Laboratory (HOAL) catchment (Blöschl et al. 2016), Petzenkirchen, Austria, by means of Double-Ring Infiltrometer (DRI). The DRI measurements were carried out in 136 locations, grouped in 12 stations, and in each station measurements distant 3m one another were performed.

In order to study the uncertainty of mean K_s, $\bar{K}_s$, as a function of both the number of measurements and the size of the sampled area, an analysis on the observed values of the station which provided the largest data-set was performed. With a minimum of 6 measurements the amplitude of the 95% confidence interval of the geometric mean decreases to a factor of 1.9, regardless of the sampled areal extent and the sample size. This tolerance value is consistent with Ahmed et al. (2015), where a reduction factor of 2.5–3.25 was considered as threshold for the determination of a minimum number of measurements.

To develop a pedotransfer function (PTF) for the HOAL catchment, soil texture, organic matter content and average slope were considered as predictor variables for the determination of the dependent variable K_s. On the basis of the previous analysis, the observed K_s local values were averaged by 6 measurements at a time. Due to the presence of multicollinearity in the matrix of regressors, the Ridge regression technique was applied. The prediction ability is quantified by the index of agreement d = 0.91. A map of $\bar{K}_s$ for the HOAL is also produced, which shows a pattern similar to the soil types map of the catchment.

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