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Pedotransfer for infiltration estimation

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Recently progress in the international infiltration studies has been stimulated and summarized by Harry Vereecken and colleagues in several international efforts. These developments created opportunities to expand the knowledge on infiltration to large-scale projects by developing pedotransfer functions for infiltration equations. The complexity of relationships between parameters of infiltration equations and readily available soil and landscape data calls for the use of machine learning methods for the PTF development. This work's objective was to run a pilot project on pedotransfer for infiltration with the data from large international Soil Water Infiltration Global (SWIG) database and address the following questions:
1. Can soil basic properties and land-use inform about the most appropriate infiltration equation and, if yes, then what are the most influential predictors?
2. Can soil basic properties and land-use be used as predictors of infiltration equations' parameters, and if yes, then does the accuracy of the parameter estimation depend on the accuracy?
Research with 1830 SWIG datasets showed that which infiltration equation will perform the best depends on the input soil properties and land use domain. Inputs that predicted the Horton, Kostiakov-Lewis (Mezencev) equation being the best, provided more reliable predictions than inputs that pointed to Green-Ampt, Philip, and Swartzendruber equation being the best. The infiltration measurement method was a dominant predictor, and using the textural class provided the accuracy of predicting the best equation comparable with using the silt, sand, and clay contents. The accuracy of predicting Horton and Mezencev equations' parameters did not depend on the performance of these equations. This accuracy strongly depended on the infiltration measurement method. Further research is needed to understand how to establish the threshold to consider the accuracy of two equations different. Also, the dependence of pedotransfer accuracy on affected by the observed infiltration stages needs to be studied. Overall, opportunities exist to provide additional means for infiltration modeling in multiple applications.

Time Block Preference

Time Block C (18:00-21:00 CET)

References

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