Contribution ID: **732** Type: **Oral Presentation**

On the value of using electrical resistance tomography to enhance sub-surface heterogeneity representation in HYDRUS 2D for simulating solute transport at the hillslope scale.

Monday, 31 May 2021 19:15 (15 minutes)

Solute transport modeling at the hillslope scale warrants a detailed soil domain description. This is true even if we expect only matrix flow since variations in soil layering, like differences in the depth to impeding layer, could alter the location where preferential flow processes like funnel flow occur. The traditional pedological soil horizon-based representation may be inadequate to represent such processes and thus lead to incorrect transport dynamics such as travel time even if the average signature of solute concentration is adequately represented. On the other hand, there is a trade-off to an increased representation of heterogeneity which is the problem of equifinality. In this study, we compare a parsimonious genetic horizon based model with a detailed model to assess the value of increasing heterogeneity representation for modeling transport of a conservative solute (chloride) at the hillslope scale. The study site is located in the Piedmont region of Georgia that is characterized by deep saprolite and variable bedrock depth. We developed the detailed model by estimating a high resolution soil texture map of the hillslope that was derived using soil electrical resistivity in an Artificial Neural Network (ANN) framework. The ERT driven soil layering model uses three easily measured inputs: soil resistivity, relative depth of investigation, and weekly antecedent rainfall. To train and test the model, we used soil samples, collected in 30-cm increments up to 510 cm, from 11 different locations across a 42 m hillslope transect. Texture was measured using a laser particle size analyzer. We used bootstrapping to train and test the ANN framework to identify the minimum set of soil samples required to generate an acceptable dataset and concluded that models trained on 6 locations had the least uncertainty. The soil texture predictions had values of R2=0.74 and RMSE=0.4. From the obtained textures, we created a hillslope domain in HYDRUS 2-D to predict hydrological and chloride transport at the hillslope scale. Both models are calibrated using water table elevations. In this presentation, we will discuss the soil texture determination process from ERT and the key differences in calibration and predictions for the two hydrologic models.

Time Block Preference

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

References

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