



A Critical Analysis of Transverse Dispersivity Field Data

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Spreading of solute plumes in groundwater is often quantified by macrodispersivity. Thereby, the transverse α_T and vertical α_V characterize the broadening of the plume in the vertical plane, perpendicular to the flow direction. Determining α_T and α_V from field experiments is difficult and costly. Still, it is an important parameter for making predictions of contaminant transport e.g. for stationary contamination plumes, bio-degradation and natural attenuation.

Measured values of α_T and α_V at field scale are only available for a few sites. Gelhar and coworkers classified in 1992 the values into three reliability groups: highly, moderately and lowly reliable. Only recently, we could show for the longitudinal macrodispersivity α_L , that the values of low reliability need to be excluded for further analysis, based on a re-evaluation of the experiments. Furthermore, new studies emerged in the meantime, which requires evaluation of reliability and incorporation, when appropriate.

This work focuses on collecting reliable field data of transverse and vertical macrodispersivities. The ensemble of reliable α_T and α_V values is then used to answer the following questions: (i) Is there an upper limit of α_T and α_V or the tendency of increasing values with increasing travel distance of tracer plumes? (ii) Can the field data be predicted by theoretical models? (iii) What can we learn from the field based ratios α_V/α_T and α_T/α_L ? The investigation may provide valuable information for modeling and predicting contaminant transport in groundwater.