

EGU21-16095

<https://doi.org/10.5194/egusphere-egu21-16095>

EGU General Assembly 2021

© Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.



## Upscaling Subsurface Transport from the Column to the Field: A Focus on the Meso-Scale

**Margaret Stevenson**<sup>1</sup>, Thomas Oudega<sup>1</sup>, Gerhard Lindner<sup>1</sup>, Andreas Scheidl<sup>2</sup>, Alexander Eder<sup>2</sup>, Peter Strauss<sup>2</sup>, and Alfred Paul Blaschke<sup>1</sup>

<sup>1</sup>Centre for Water Resource Systems, Vienna University of Technology, Vienna, Austria

<sup>2</sup>Institute for Land and Water Management Research, Federal Agency of Water Management, Petzenkirchen, Austria

Upscaling groundwater transport from the column scale to the field scale is relevant because field tests with various tracers are often too expensive or not permissible, due to public health or environmental concerns. Therefore, when testing chemical or pathogenic tracers, work is often done using small scale columns in the laboratory and results are extrapolated to the field. Several studies compare tracer transport in small-scale columns to tests in the field, but there is yet to be a study that compares groundwater transport using a meso-scale as well. Within a framework of upscaling, three scales are considered: small laboratory columns (0.1 m scale), a large intact core (1 m scale), and a real-world gravel aquifer (10 m scale). The small column is filled with gravel material taken from boreholes at the field site, which is close to Vienna, Austria. The meso-scale consists of an undisturbed gravel column, which was taken from a gravel pit near Neuhofen an der Ybbs, Austria. It was found that scale effects observed may be due to heterogeneity at the macropore scale versus preferential flowpaths at the meso-scale and field scale. Additionally, differences may be observed due to the small columns being repacked with aquifer material and the large column and field site being “undisturbed”. The meso-scale column allows us to gain insight into the upscaling processes by incorporating an in-between step when comparing groundwater transport at the column to the field scale.