# Environmental factors affecting the transport of DNA-tagged particle tracers in saturated porous media

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## INTRODUCTION

Biological and engineered colloids in the vadose zone and groundwater can threaten human health and ecosystems. The fate and transport of those types of colloid is poorly understood. In this study, we use two innovative environmental friendly particles tracers tagged with synthetic DNA <sup>[1,2]</sup>. The aim of this study is to test the applicability of these DNA-particles as hydrological tracer at laboratory scale and to understand the dominant environmental conditions that might affect tracer transport behavior.





What are the advantages of DNA-particle tracers over conservative hydrological tracer?

- Allows investigation of multiple hydrological pathways, by barcoding the tracers with distinguishable sequence of DNA<sup>[3]</sup>
- Gives the possibility to repeat tracer tests in one place without confounding the signal of the new tracer with previous ones <sup>[3]</sup>
- Can enhance our understanding of the temporal variation of flow and solute pathways in dynamic hydrological systems



## **RESEARCH QUESTION**

- How reliable are the DNA-tagged particle tracers in saturated column experiments?
- Which environmental condition can hinder the applicability of the DNA-tagged tracer tracers?
- What are the dominant retention mechanisms that result in low mass recovery rate?

[1] Paunescu, Daniela, et al. Nature protocols 8.12 (2013): 2440-2448



### **SPED 2**<sup>[2]</sup>

Magnetic core Synthetic DNA Silica shell

- soil grain size
- and lonic strength.



**Tracer solution** Solution





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