

WP4.2 – Assessing the fate of contaminants of emerging concern (CECs) in effluents during irrigation



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Research objective

- Creating a contaminant transport prediction model that is suitable for extreme dry climates
- Contribute to safe reuse of effluents in agriculture

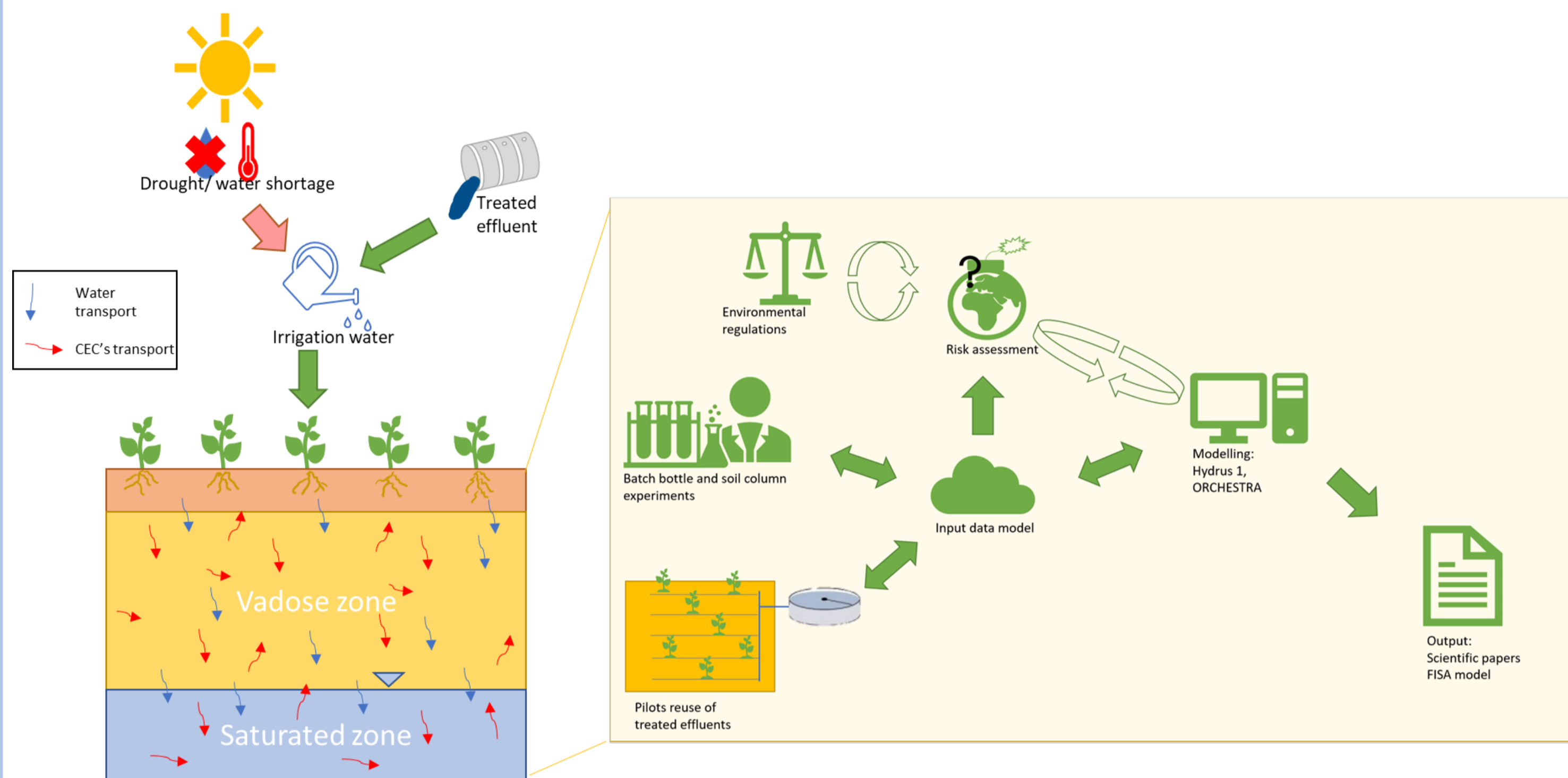


Figure 1: Schematic overview of research plan

Future plans

- Visit lysimeter setup in Qatar for additional information to optimize link between Hydrus and ORCHESTRA
- Can the metal leaching industrial biosludge model be extended for predicting the behaviour of CECs?
- How is the sorption of CECs affected by the soil characteristics of sandy soils?
 - CECs selected are a mixture of low biodegradable micropollutants found in effluent WWTP in the Netherlands
 - A mixture of around 60 compounds (pharmaceuticals, personal care, persistent transformation products and PFAS)
 - Start a database for CEC sorption to sandy soil
 - Parameterize CECs to different sandy soils and understand the effect of the soil composition
 - Visiting TNO for fresh Dutch sandy soils for continuing step 3

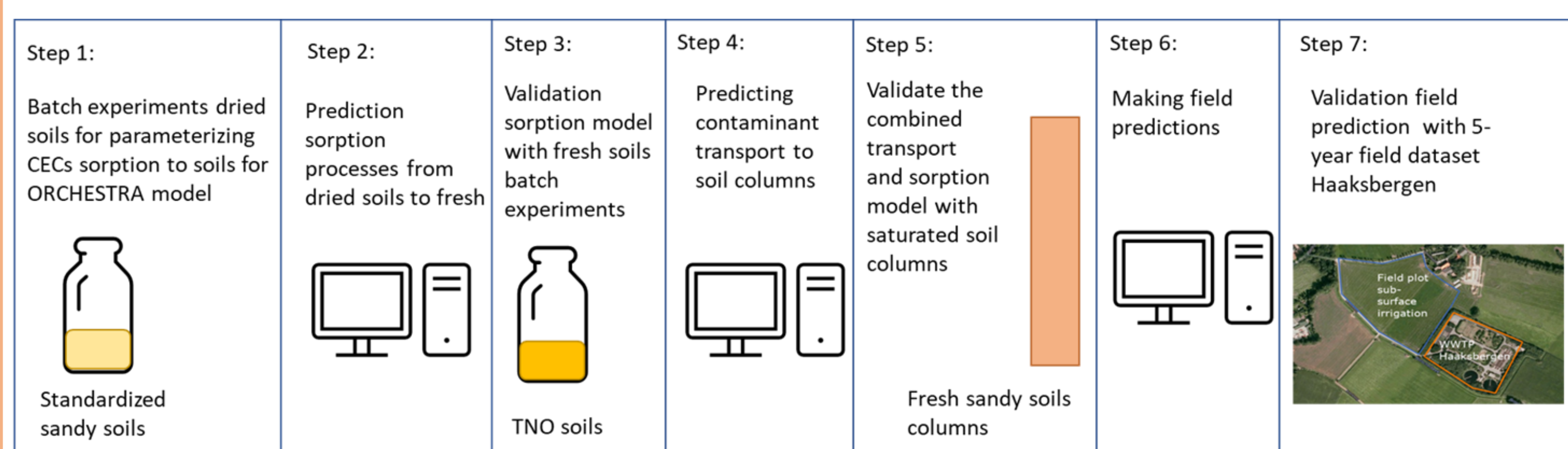


Figure 5: Plan for understanding the sorption behaviour between low biodegradable micropollutants and sandy soils

Results

- Modelling leaching of metals from industrial biosludge used as fertilizer in arid/desert climate

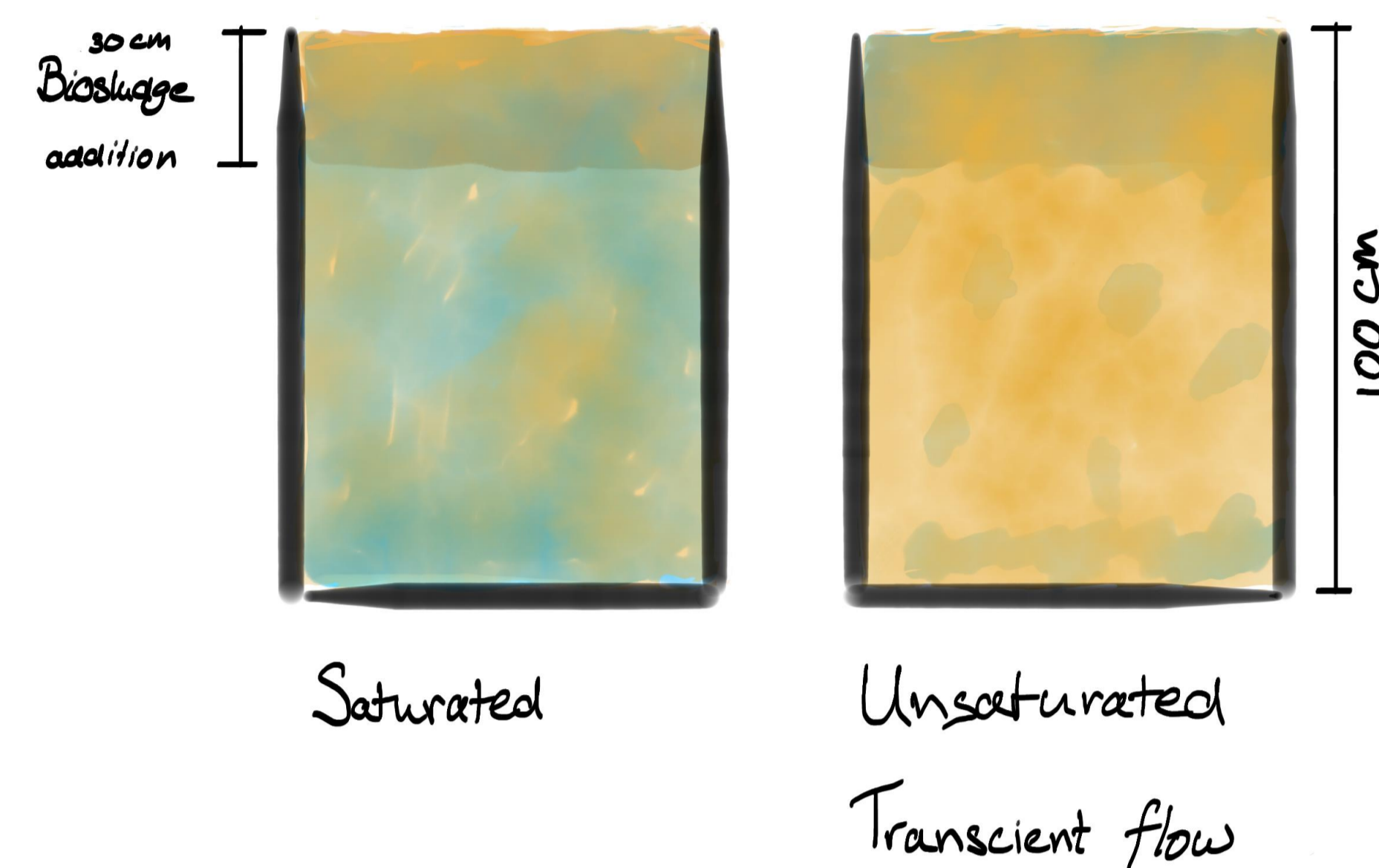


Figure 2: Different setups used to predict leaching of metals from biosludge

- Saturated and unsaturated transient flow are compared to see the effect of connecting chemical equilibrium model ORCHESTRA to Hydrus-1D
- Model can be used for prediction of sandy soils in desert climate, still optimization needed

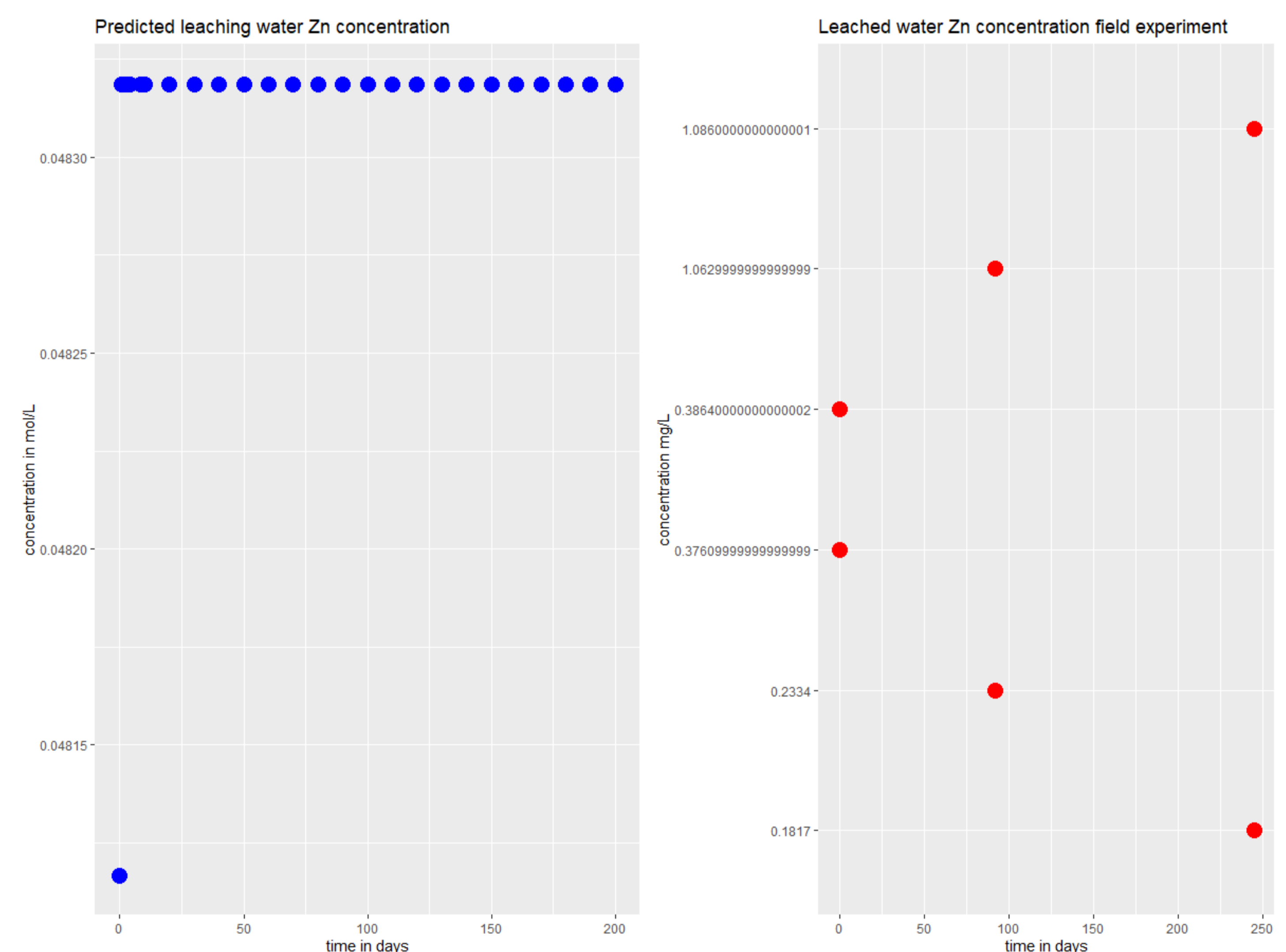


Figure 3: Comparing the predicted leaching of Zn with field data

Take-home message

- Hydrological flow model Hydrus-1D and the chemical equilibrium model ORCHESTRA can be linked

Knowledge gaps:

- Extension to CECs sorption models for predicting the behaviour of ionizable CECs
- A database for the behaviour of CECs in sandy soils