

# Detecting groundwater recharge processes using stable isotopes; Cu-Chi, north of Ho Chi Minh City

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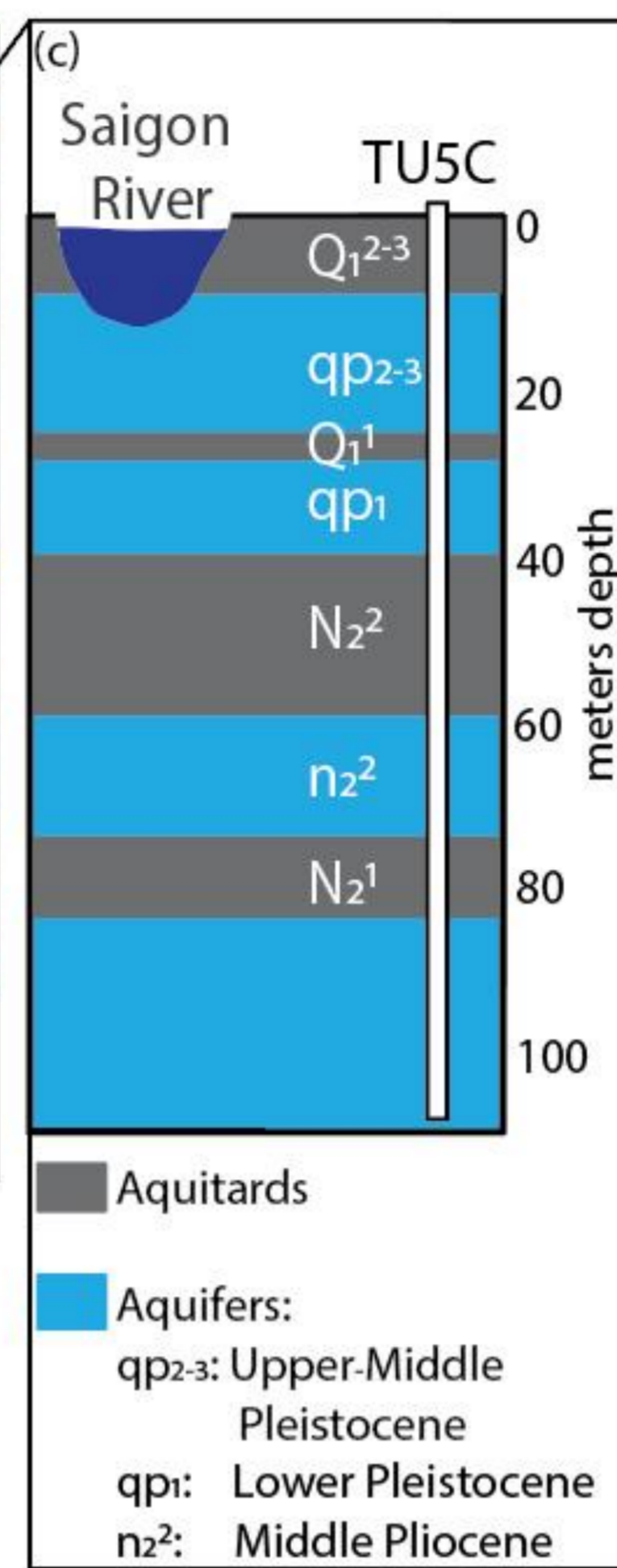
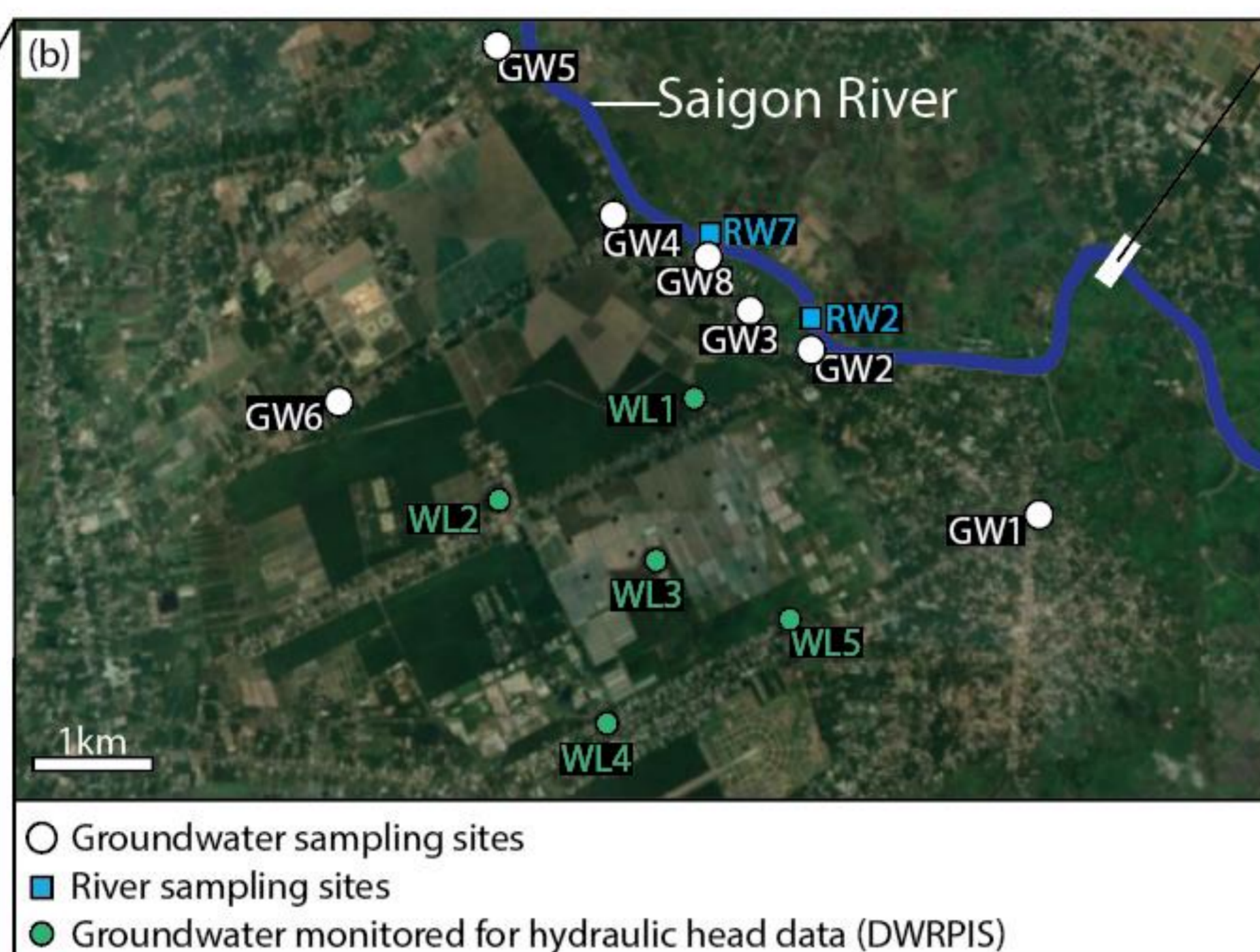
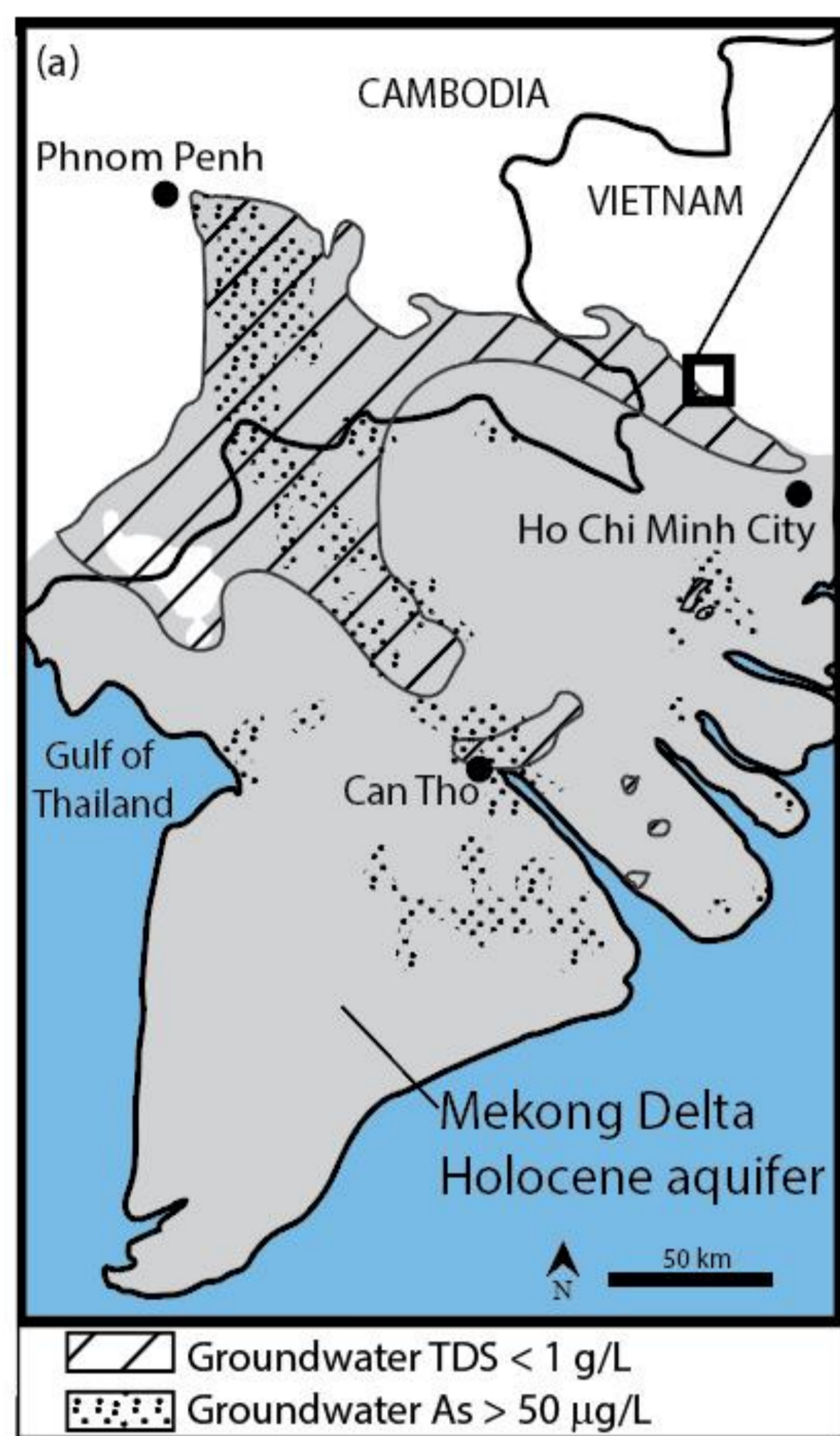
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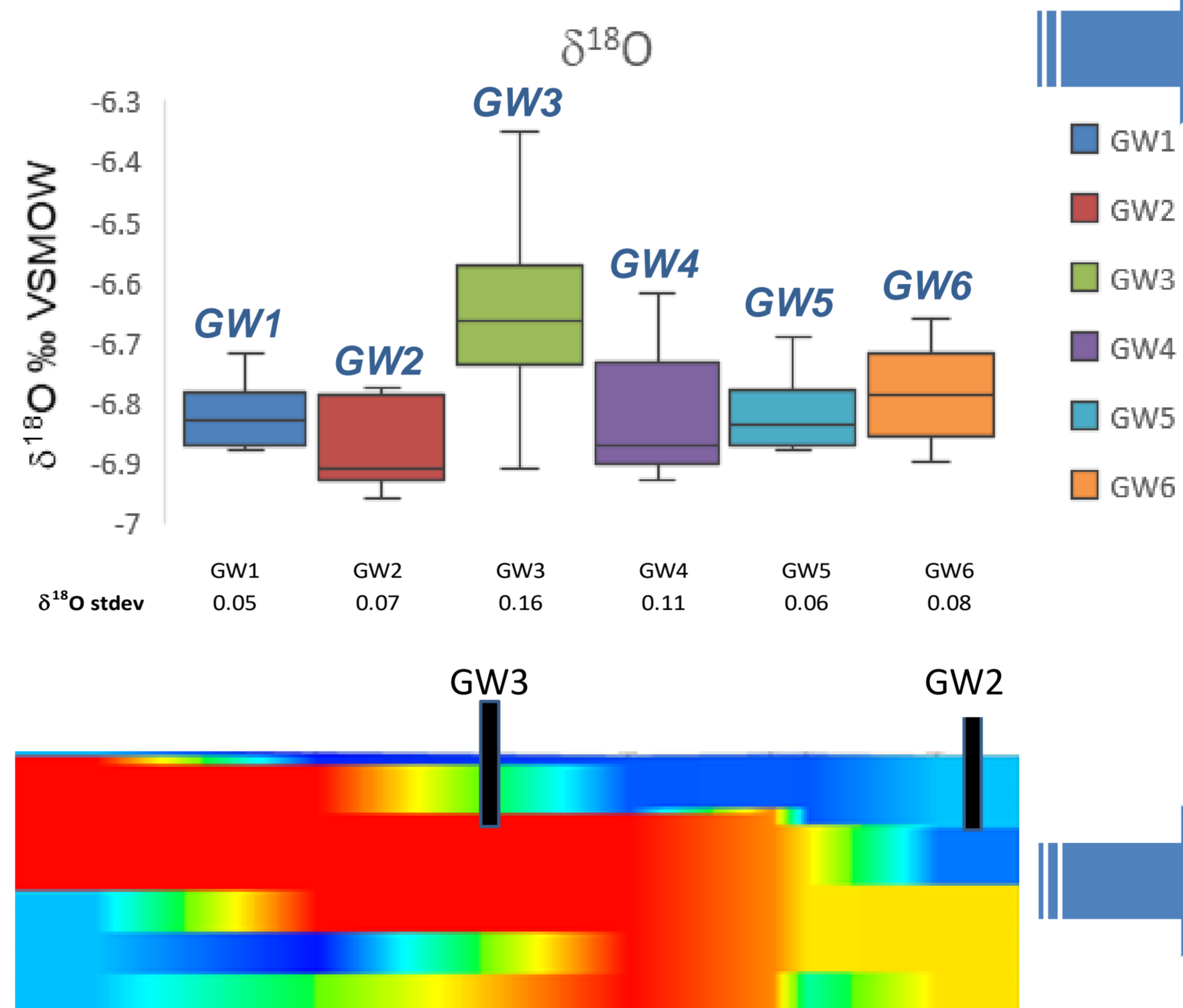
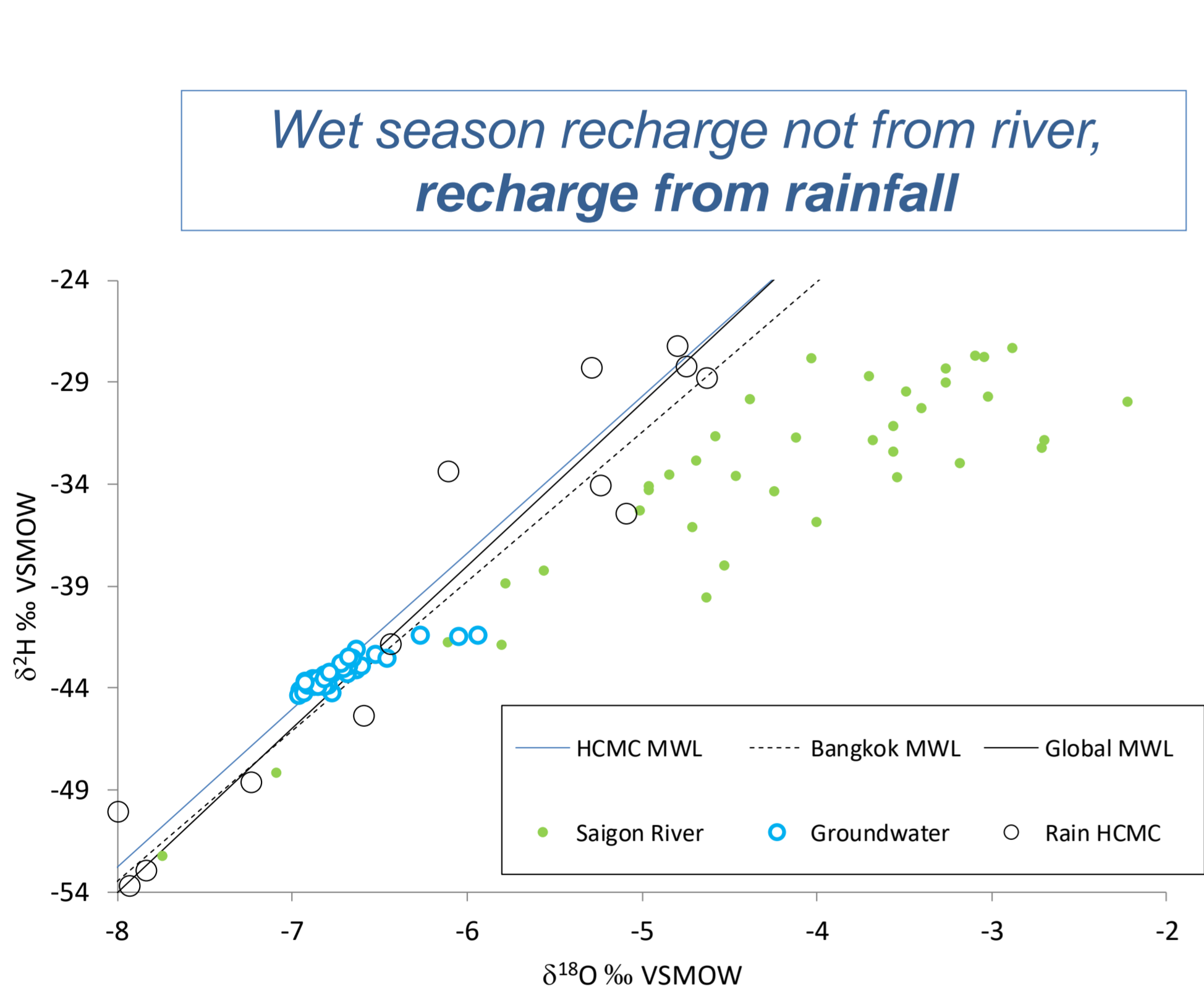
## Importance of study area and scientific questions



• Potentially important recharge area for delta groundwater resources

• Aquifer locally recharged by rain or river?  
• Clay windows that allow local recharge?  
• Implications of recharge processes on groundwater quality?

## First results: stable isotopes for recharge detection



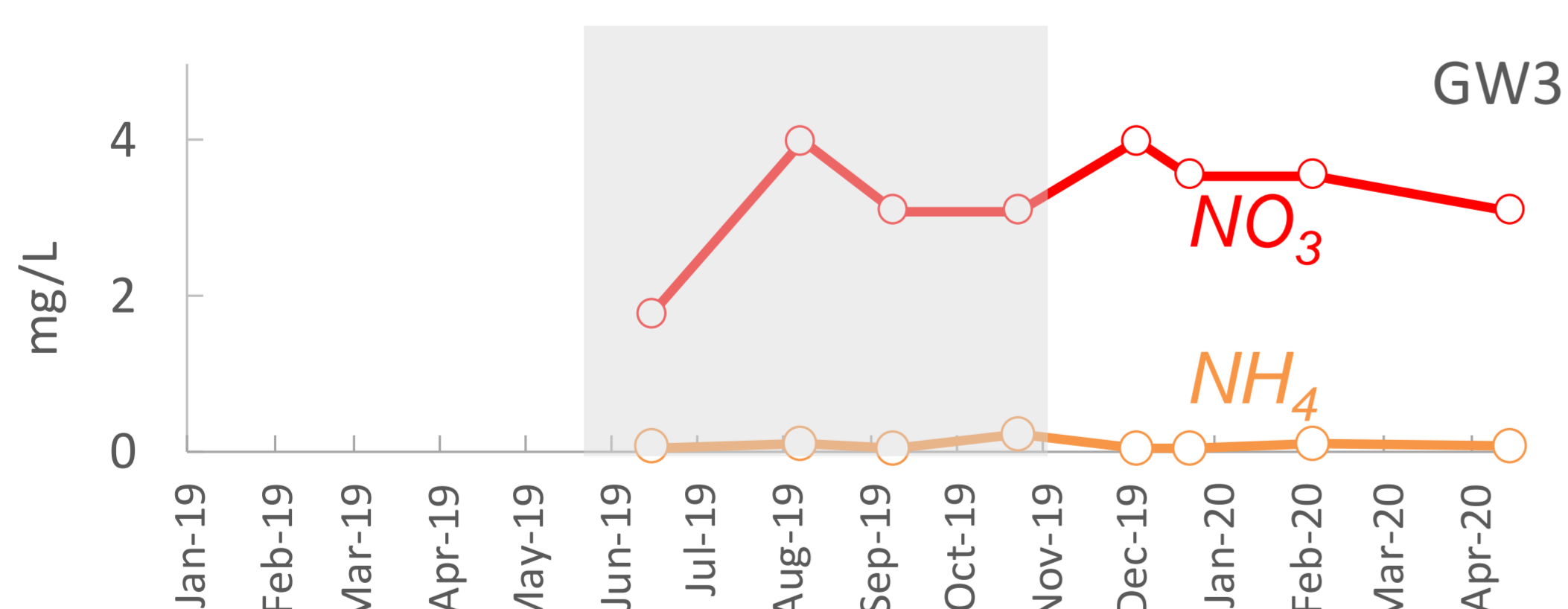
Sites of greater isotope fluctuations in groundwater during the wet season highlight areas where there is greater recharge and mixing e.g. site GW3

Box and whisker plot for  $\delta^{18}O$  for the groundwater data during the wet season (using values not fractionated due to evaporation) illustrating the spatial variations in recharge processes likely due to clay discontinuities.

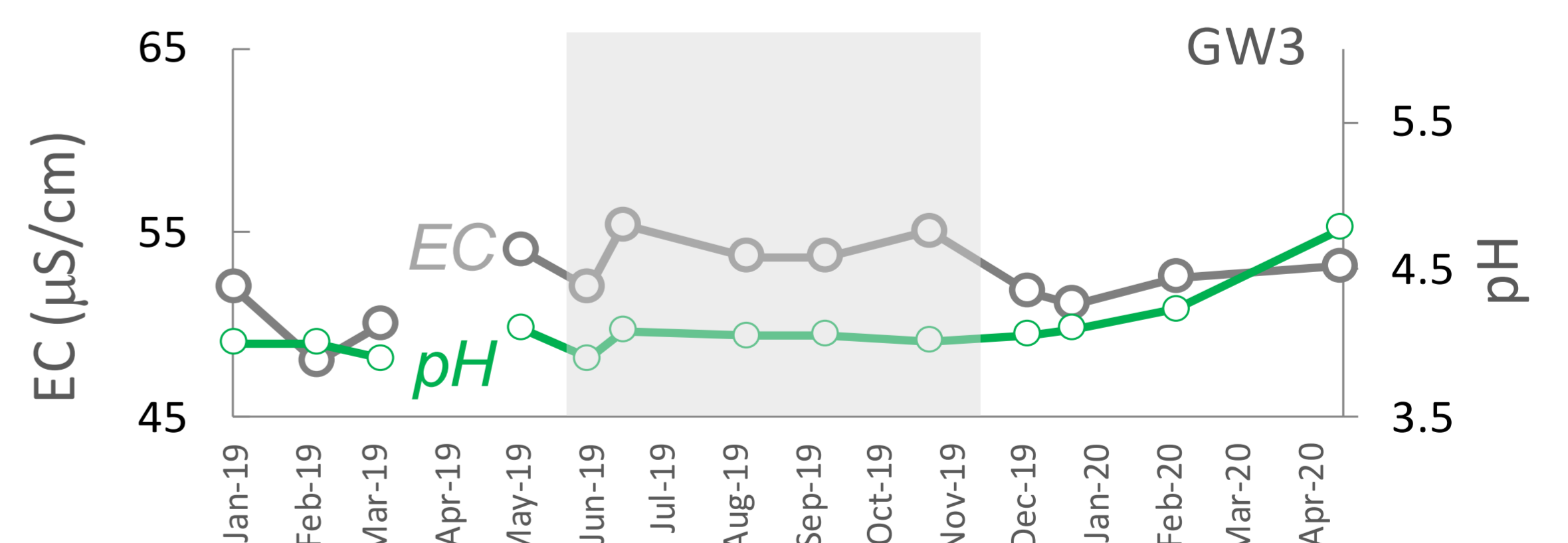
Corresponds with TDEM results site GW3: lower clay content site GW2: higher clay content

## First results: implications for N, EC and pH

Groundwater  $NO_3+NH_4$ :  $NO_3$  increase during wet season recharge



Groundwater pH+EC: no change in pH+EC during wet season recharge



## Preliminary conclusions and further studies

- ❖ Stable isotopes of groundwater helps us to identify areas of rainfall recharge to the shallow aquifer during the wet season;
- ❖ High spatial heterogeneity in recharge due to clay layers;
- ❖ Shallow aquifers have increased vulnerability to  $NO_3$  pollution during wet season, but little change in EC and pH;

❖ Next phase of project a) increase the number of bores sampled monthly for stable isotopes, b) analyse in more detail groundwater and river interaction and c) analyse seasonal changes in other pollutants in groundwater.