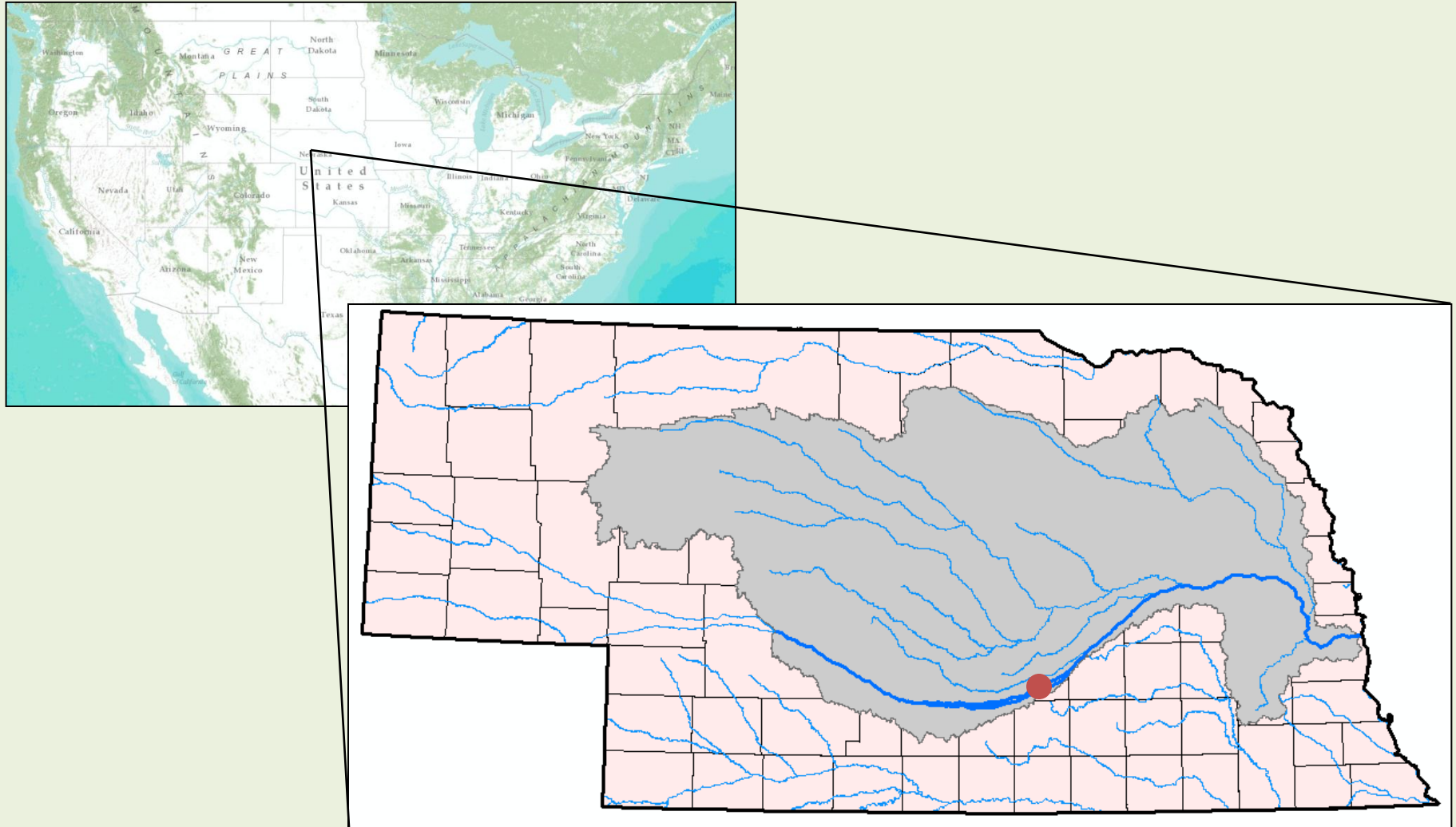
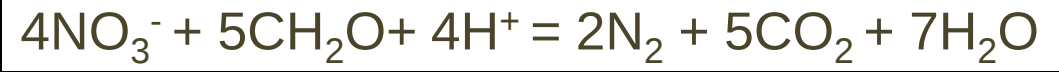


LOW NITRATE AND RAPID HYDROCHEMICAL EVOLUTION OF RIVER AND GROUNDWATER DURING 2012 DROUGHT CONDITIONS, PLATTE RIVER, NEBRASKA

Audrey Boerner¹
John B. Gates¹

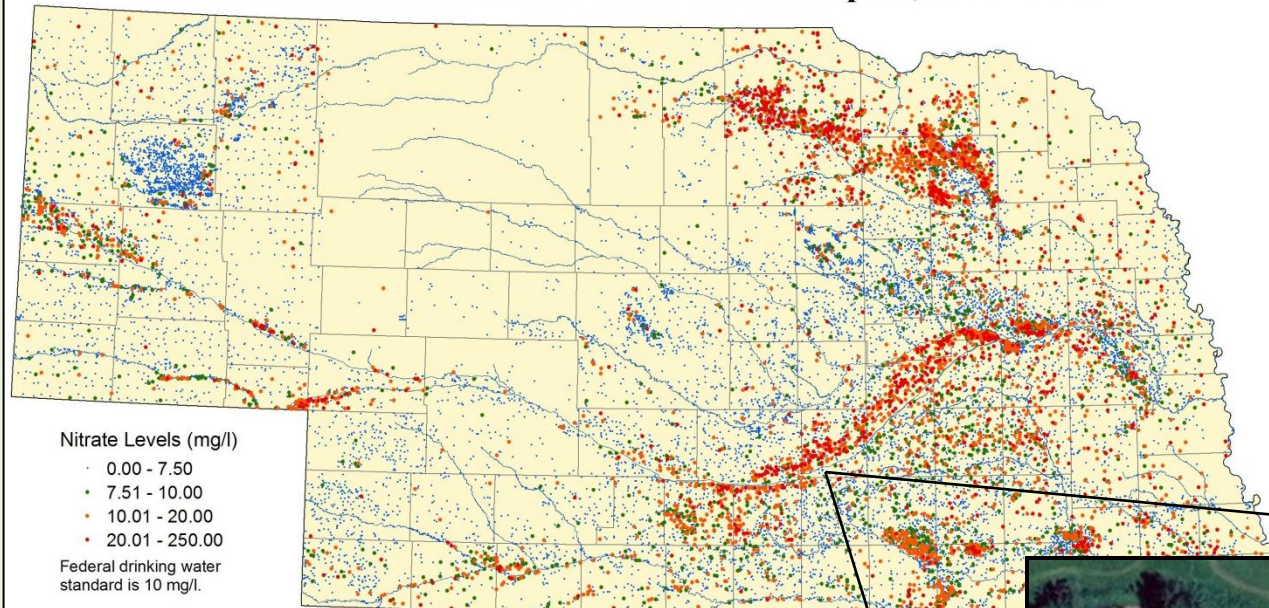
¹Department of Earth and Atmospheric Sciences, University of Nebraska-Lincoln

Background



Location & Motivation:

Generalized Nitrate Levels in Wells Sampled, 1974 - 2006

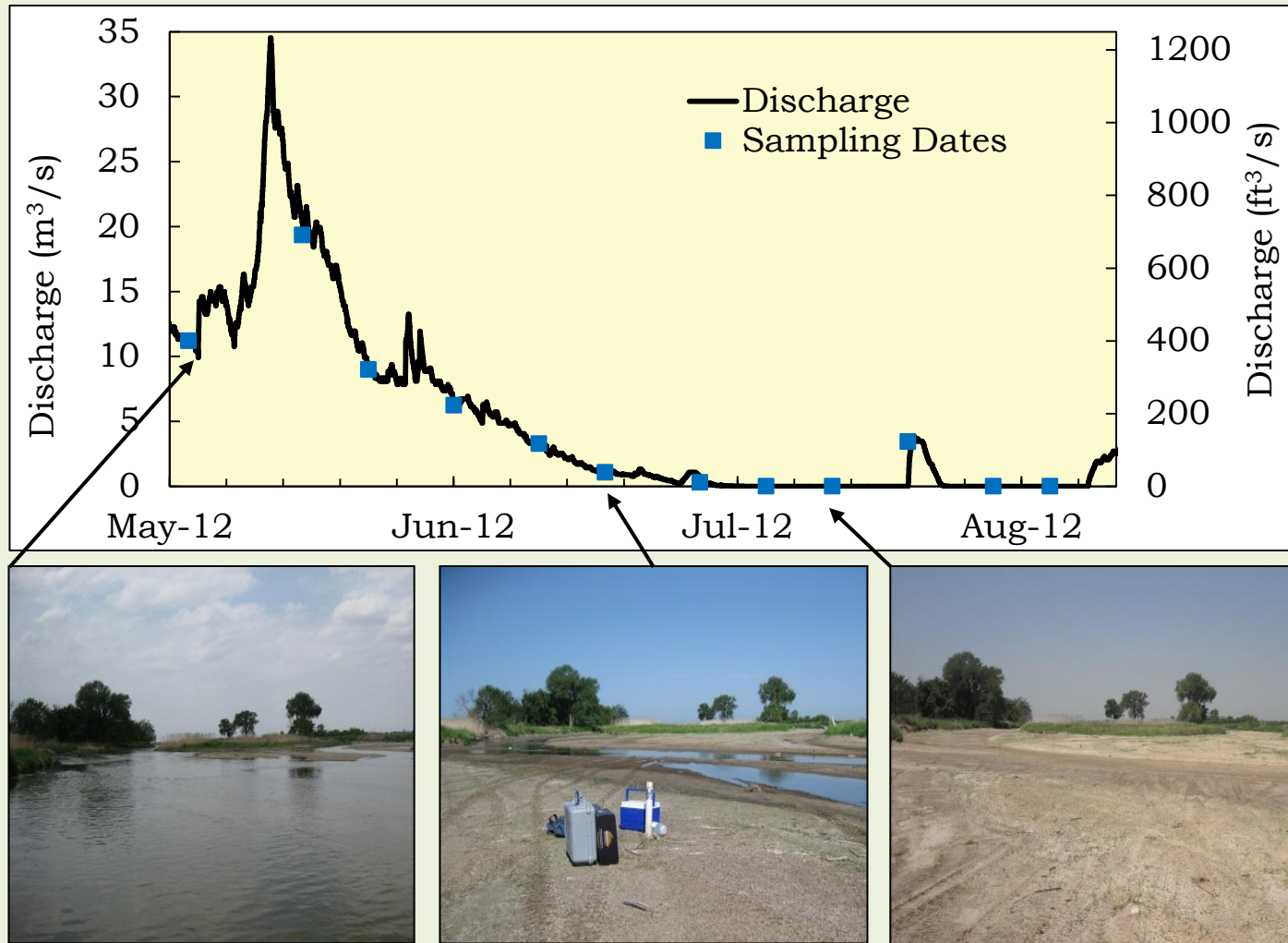


Source: Nebraska Departments of Environmental Quality, Natural Resources, and Agriculture and School of Natural Resources, UNL (www.deq.state.ne.us).

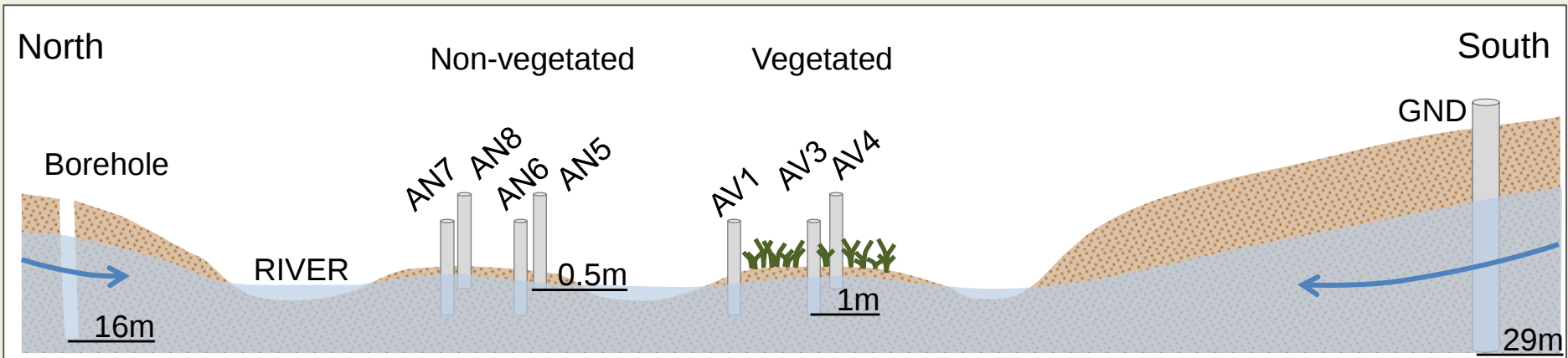


Research Questions

1. Favorable denitrification conditions?
2. Effect of 2012 drought?

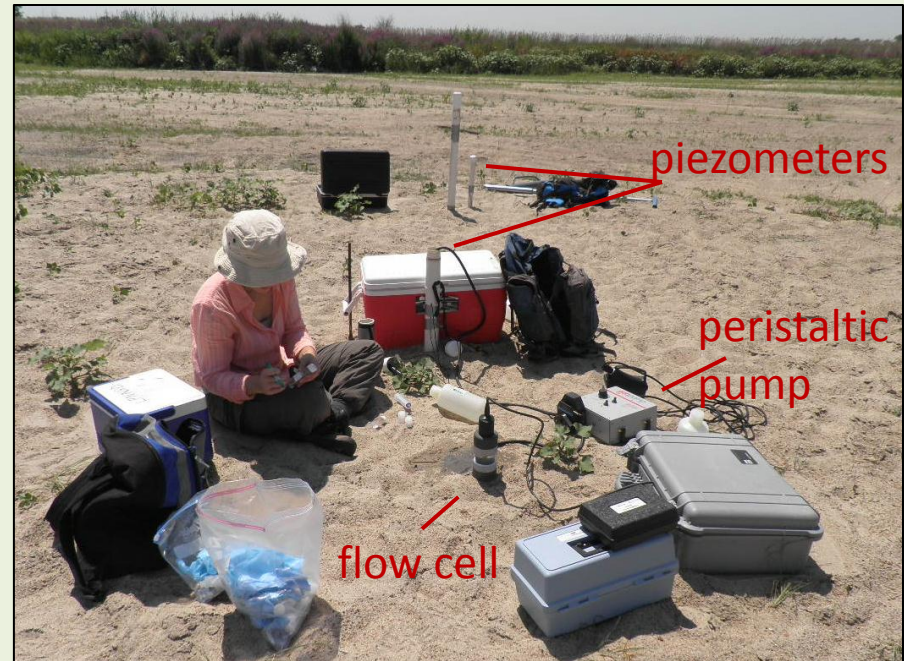


Methods

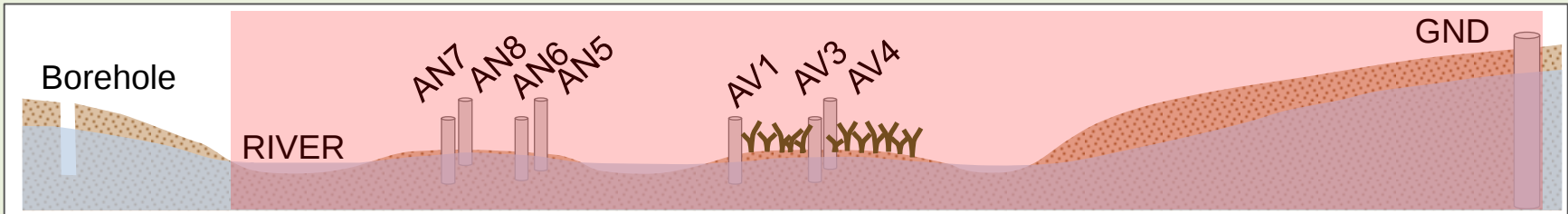
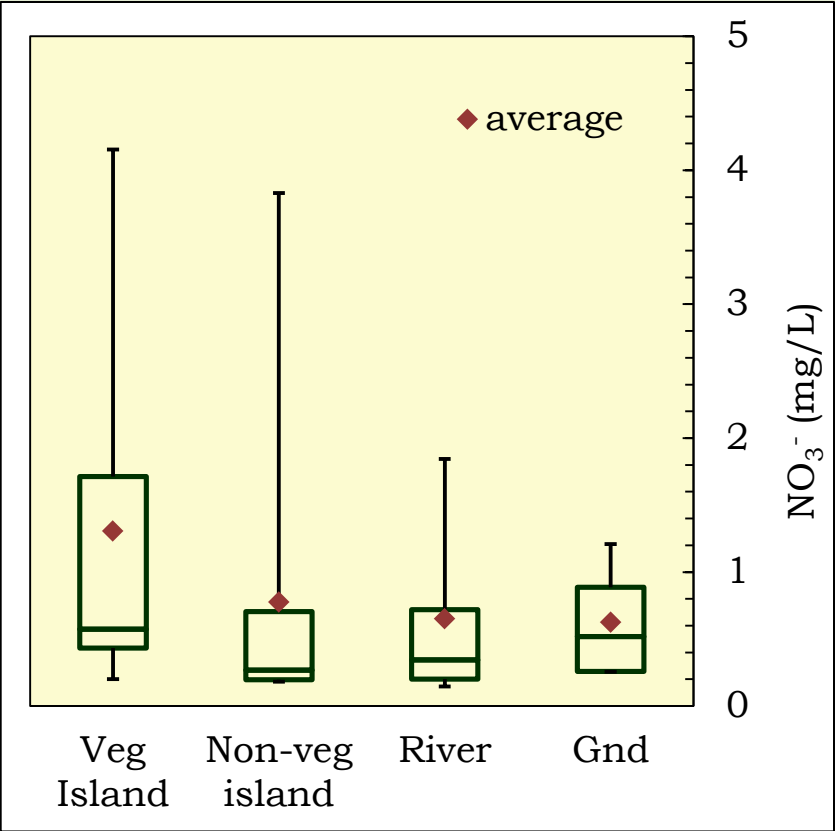
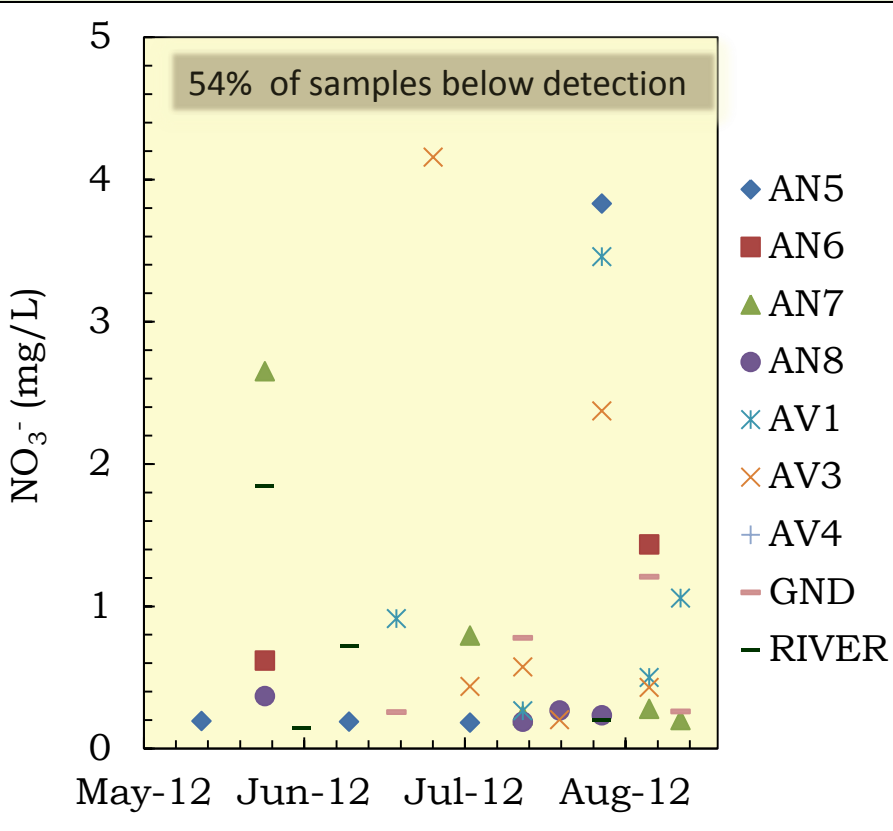


Chemical Determinations:

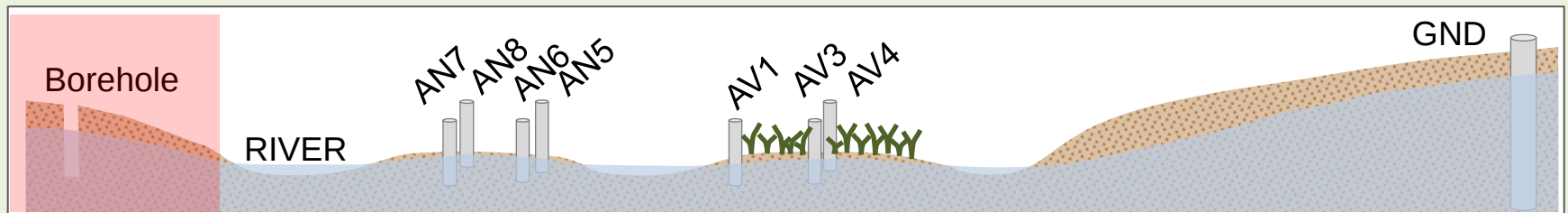
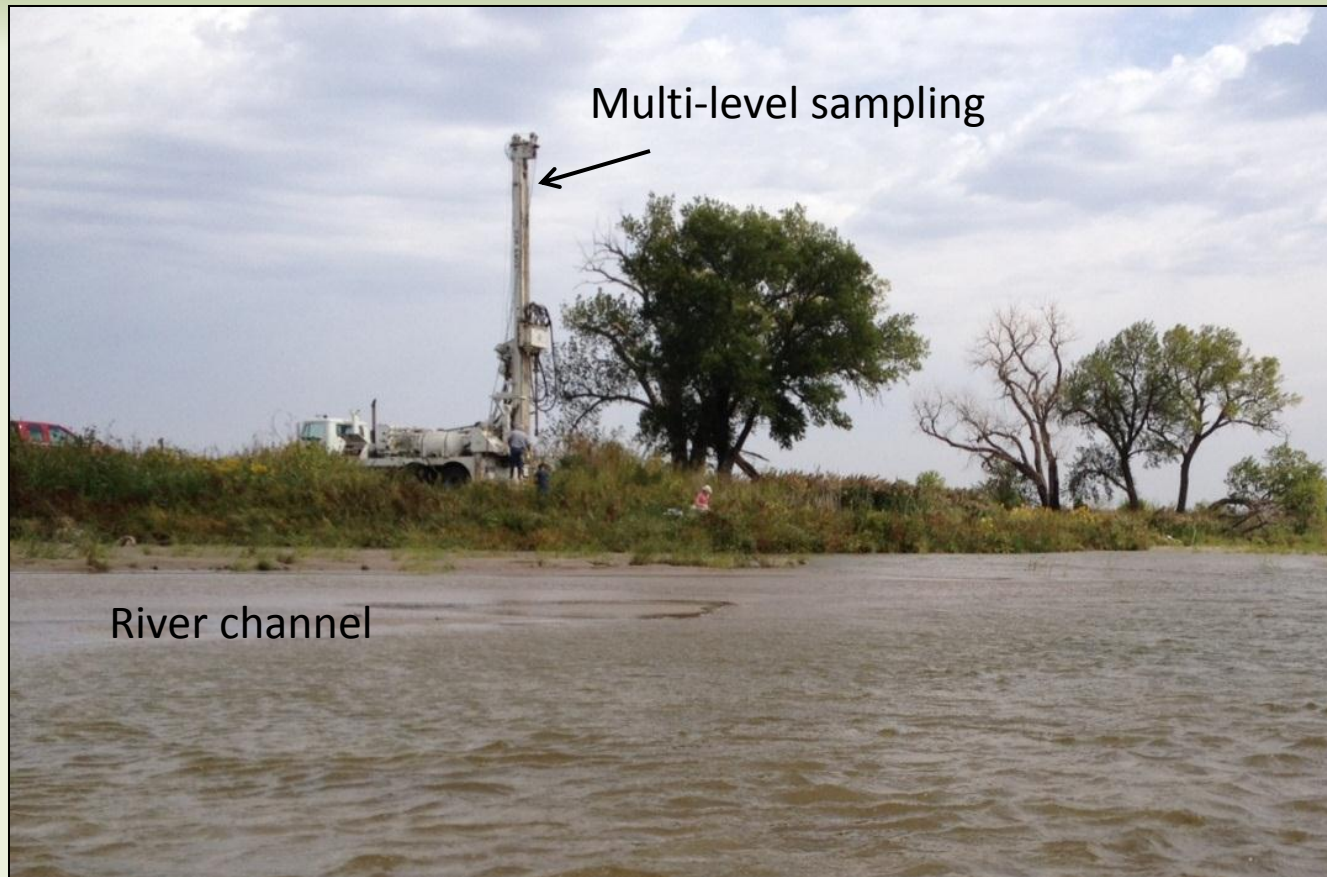
- Major ions
- Stable isotopes ($\delta^{18}\text{O}$ and $\delta^2\text{H}$)
- Ar/N₂ and ^{15}N -N₂
- Field electrochemistry



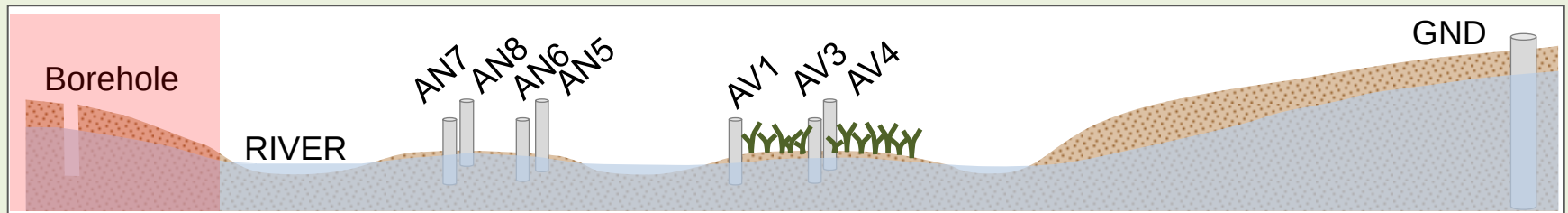
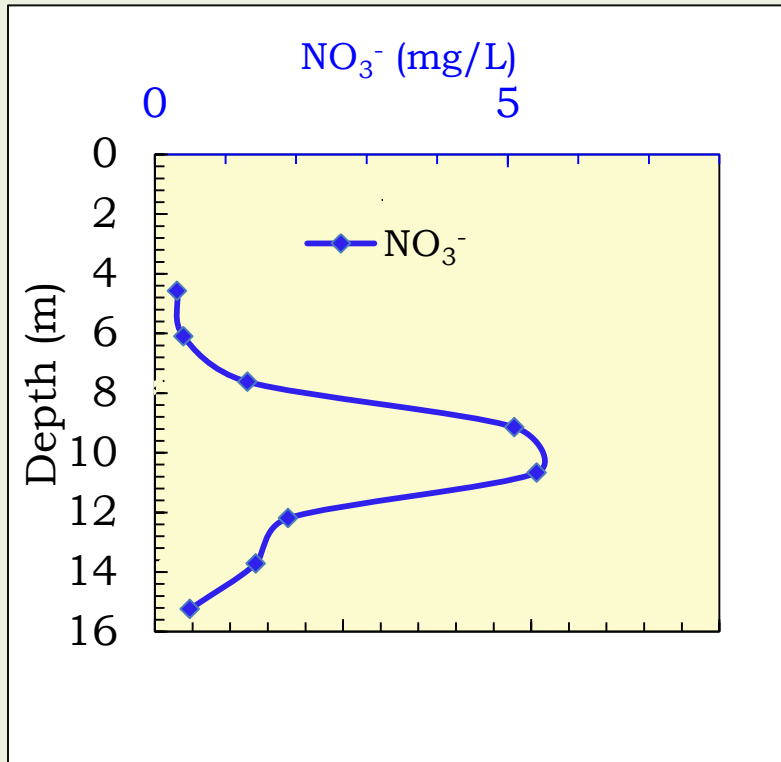
Results: Nitrate



Results: Denitrification

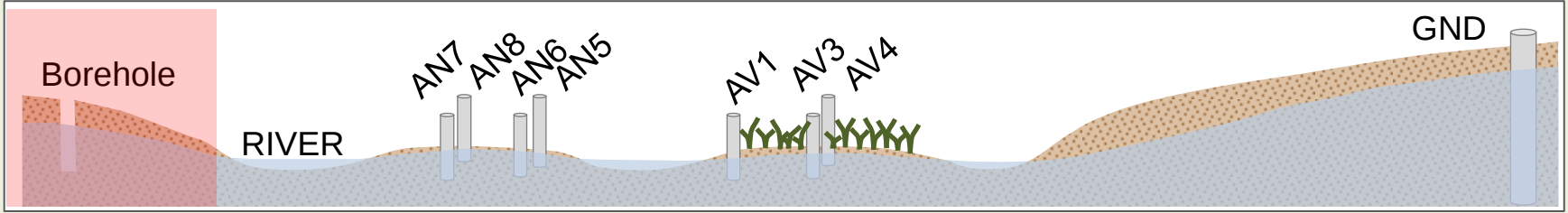
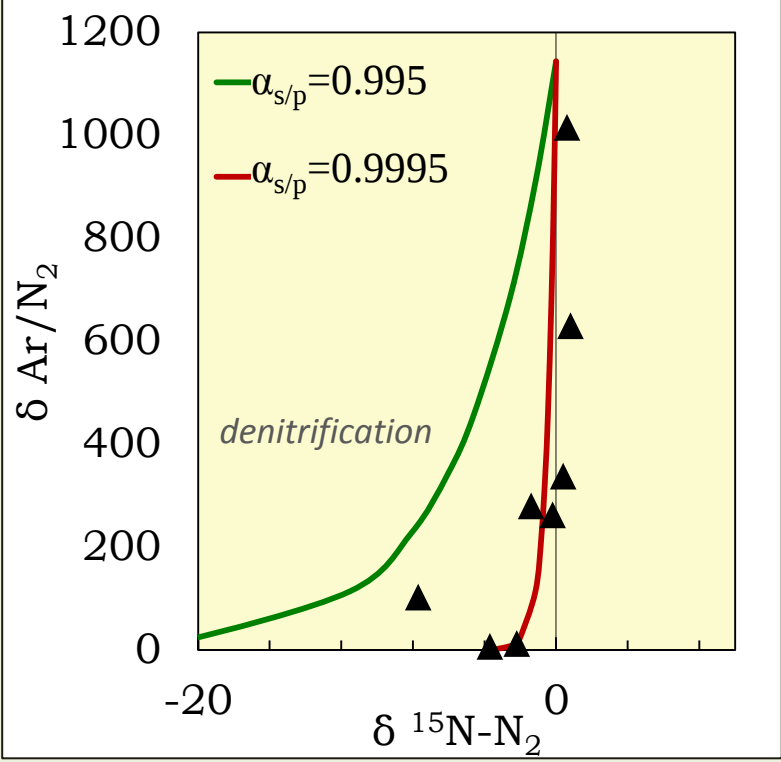
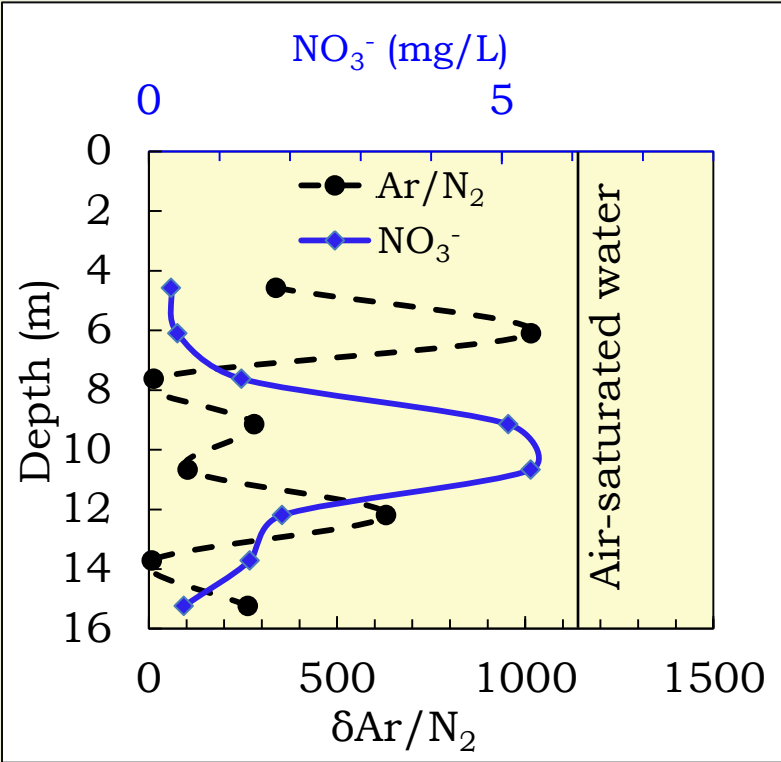
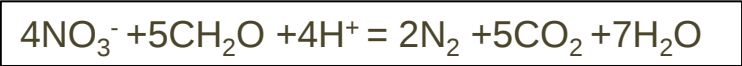


Results: Denitrification

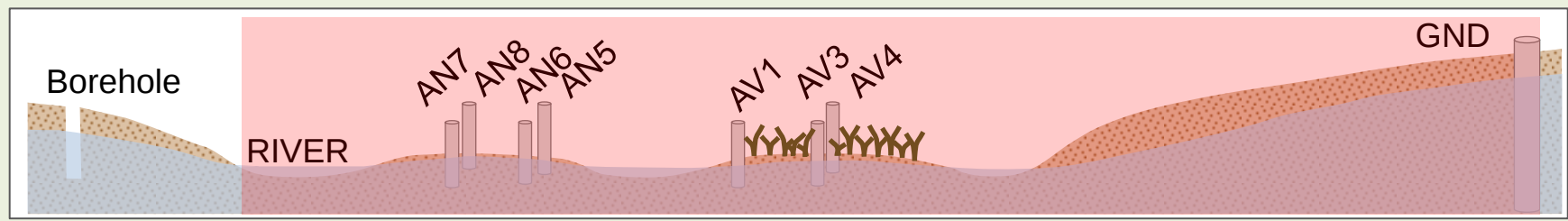
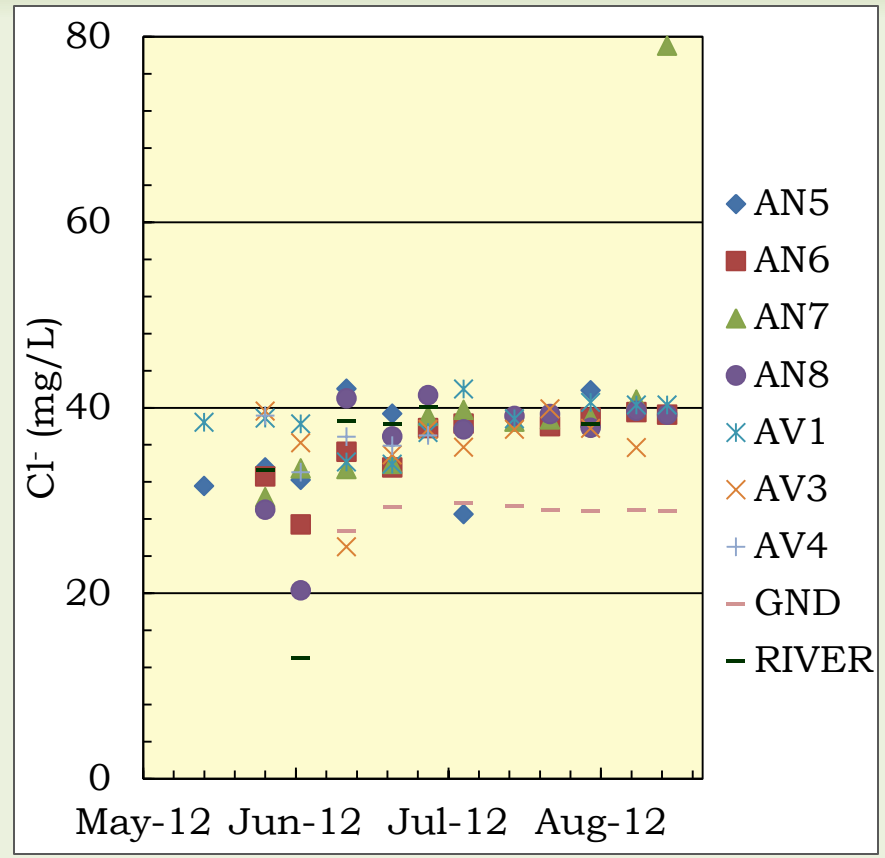
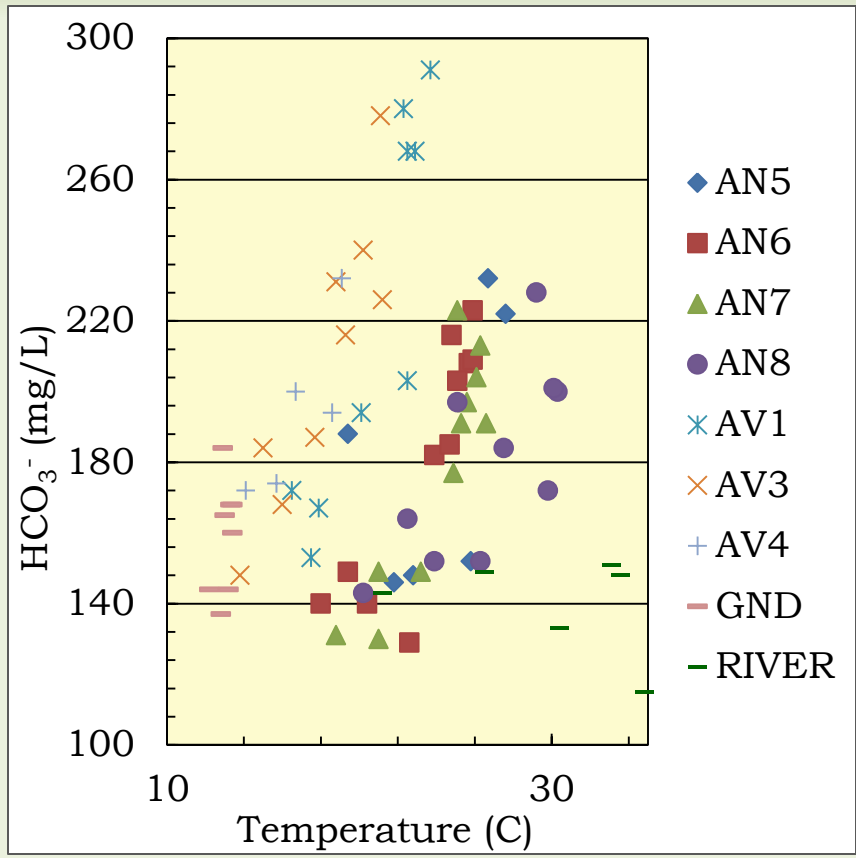


Results: Denitrification

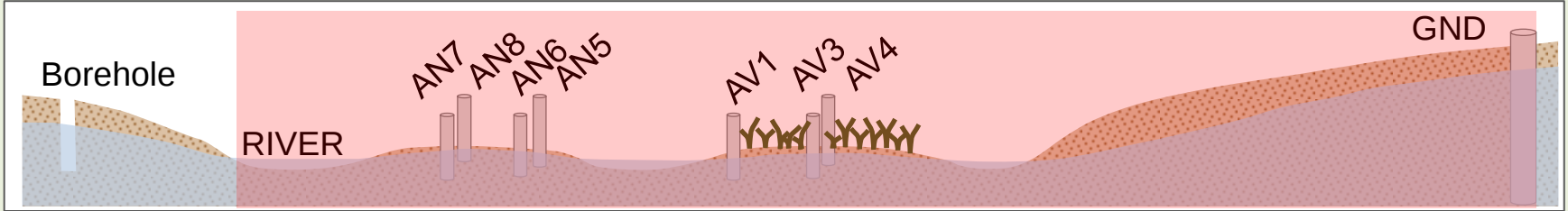
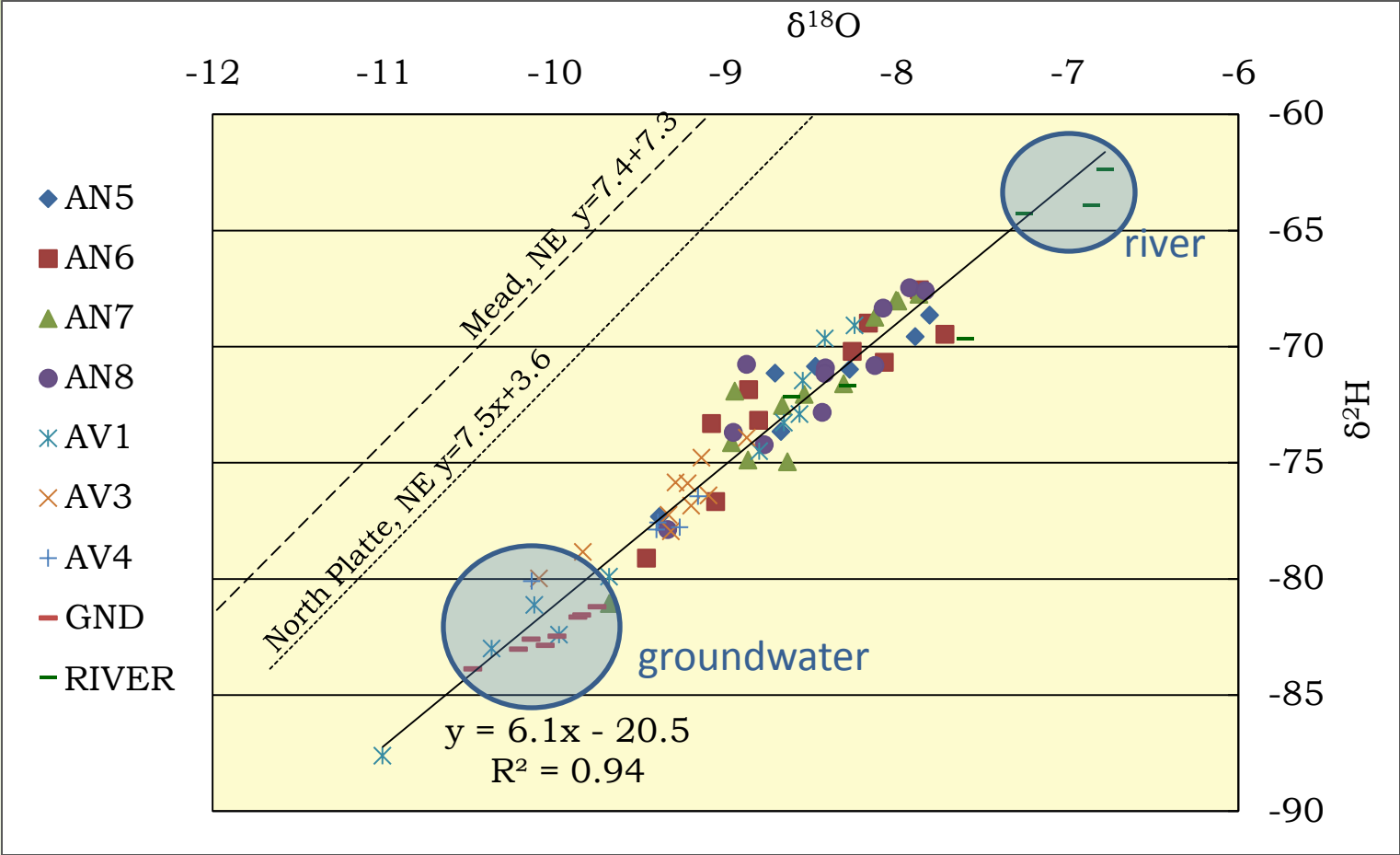
$$\delta \text{ (‰)} = \frac{R_{\text{sample}} - R_{\text{air}}}{R_{\text{air}}} * 1000$$



Results: Anions (solubility vs. evaporation)



Results: $\delta^{18}\text{O}$ and $\delta^2\text{H}$



Conclusions

1. TDS increased over the summer; strongly affected by $\text{HCO}_3^-/\text{pCO}_2$ relationship.
2. Evidence exists for denitrification of groundwater occurring outside the island monitoring zone.

Acknowledgments

Funding:

NSF Graduate Research Fellowship Program

Geological Society of America

American Association of Petroleum Geologists

Nebraska Geological Society

Phi Kappa Phi Honor Society

University of Nebraska Earth and Atmospheric Sciences Department

University of Nebraska Graduate Studies Office

Land and well access:

Crane Trust, Mary Lanning Hospital Trust, Central Platte NRD & Kevin Kauffman

Site Logistics and Sample Analysis:

Duane Woodward, Matt Marxen, Leilani Arthurs, JP Traylor, Nathan Rossman, Lindsey Brenizer, Zablou Adane, Justin Gibson, Dan Miller, and Aaron Schultis
