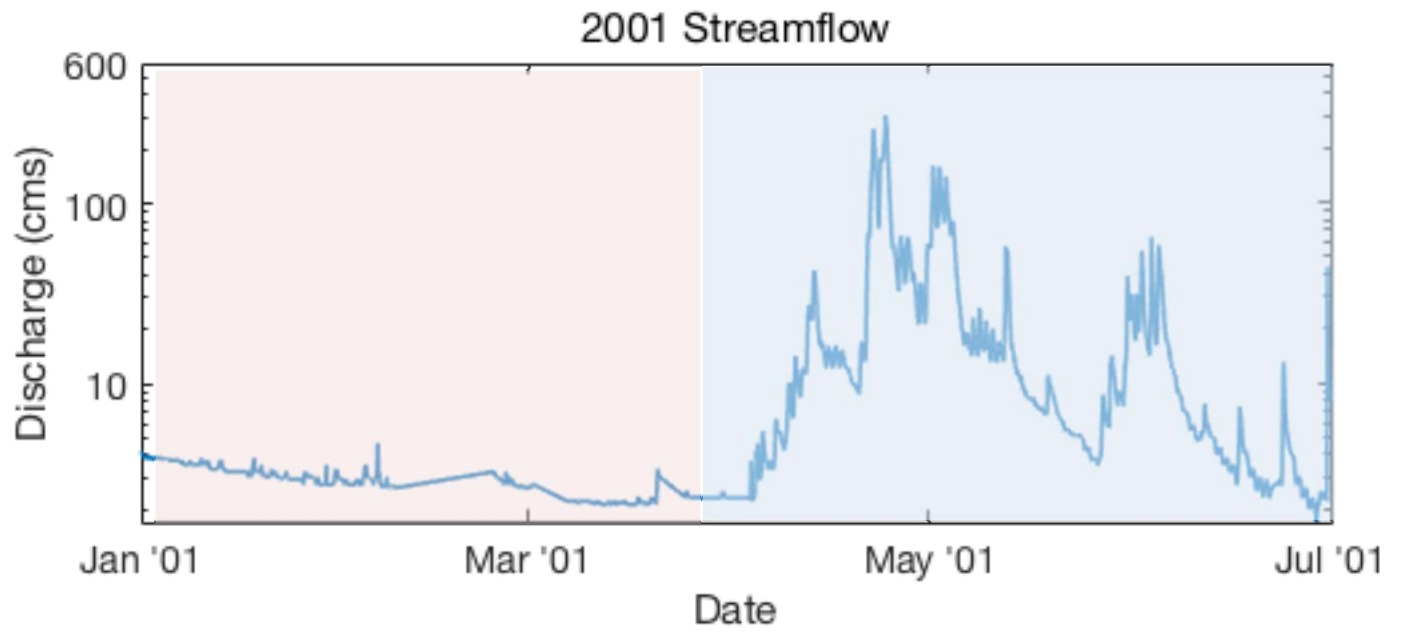


Effects of changing spring melt and land use on watershed nutrient export

Erin Seybold

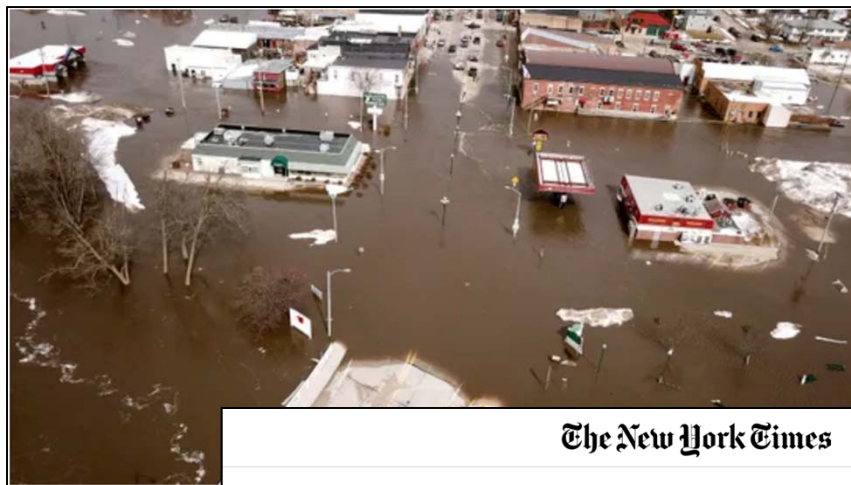
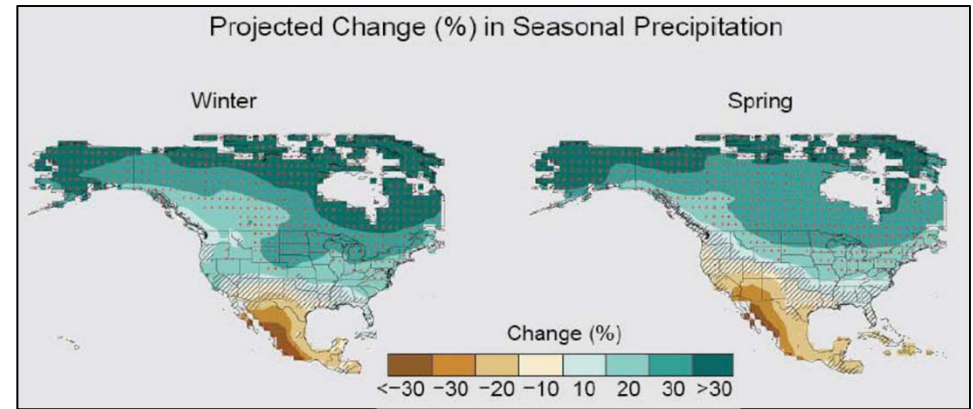


Ranch Brook, 2001



Changing winter precipitation

- Climate change will have significant impacts on winter weather
- Biogeochemical and hydrologic impacts of rain on snow (ROS) events?
- *How will ROS events influence nutrient mobilization and transport?*



The New York Times

Why Is There Flooding in Nebraska, South Dakota, Iowa and Wisconsin?

When a warm rain fell on a flat, frozen landscape, “the ingredients were in place.”

Figure: World Climate Research Program CMIP

Question

How do rain on snow (ROS) events affect nutrient mobilization and export patterns in agricultural and forested streams?

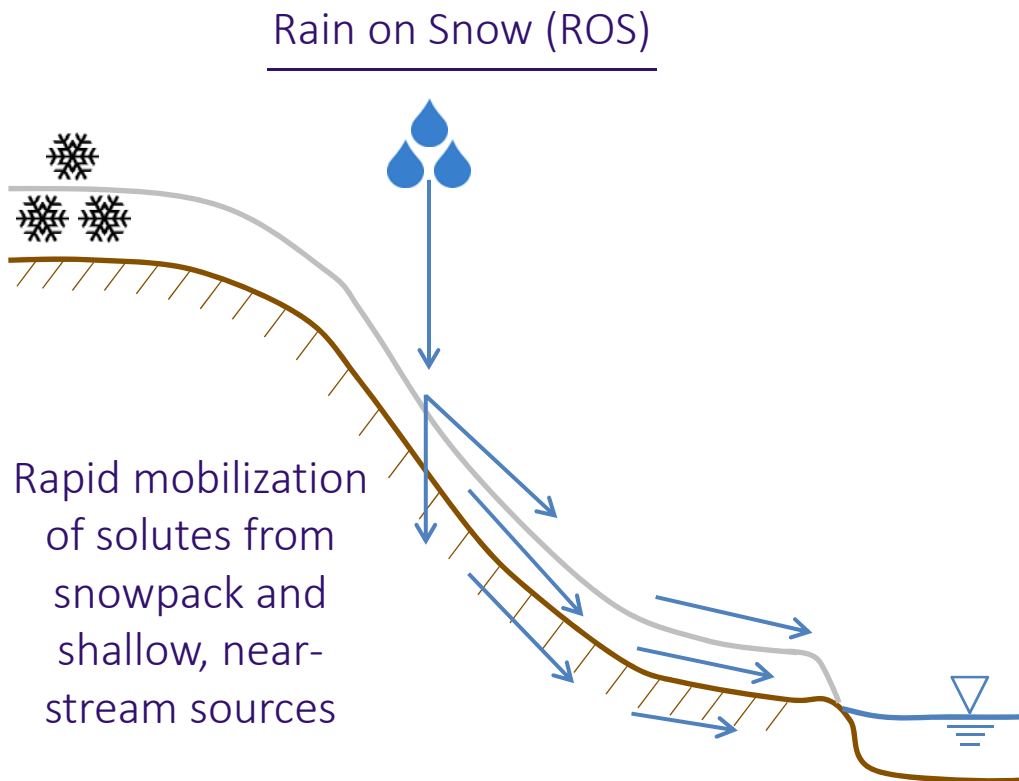
1.

Are there **unique runoff generation and solute export mechanisms** associated with ROS events?

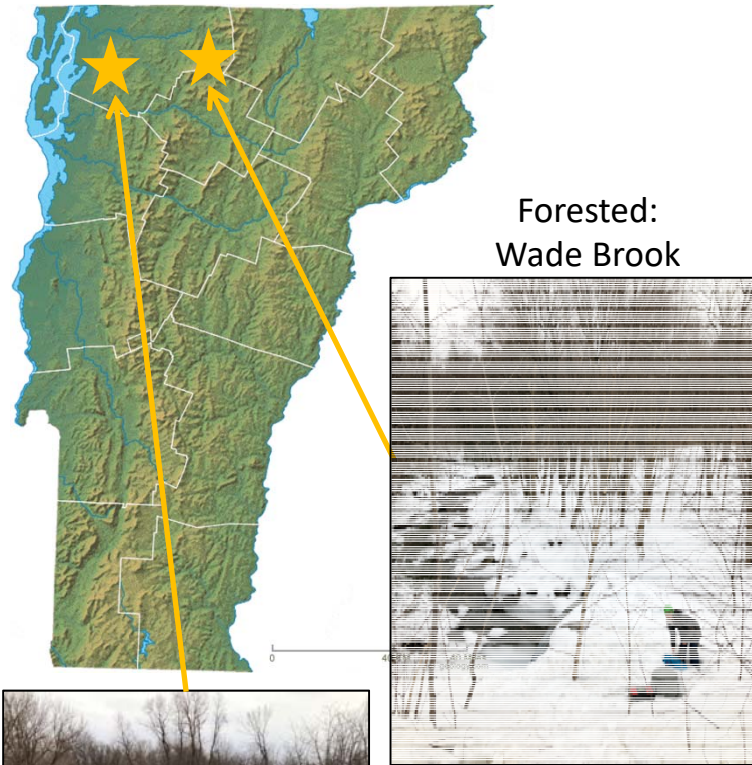
2.

How do ROS events influence the **timing and magnitude of annual loading**?

Conceptual model of runoff pathways



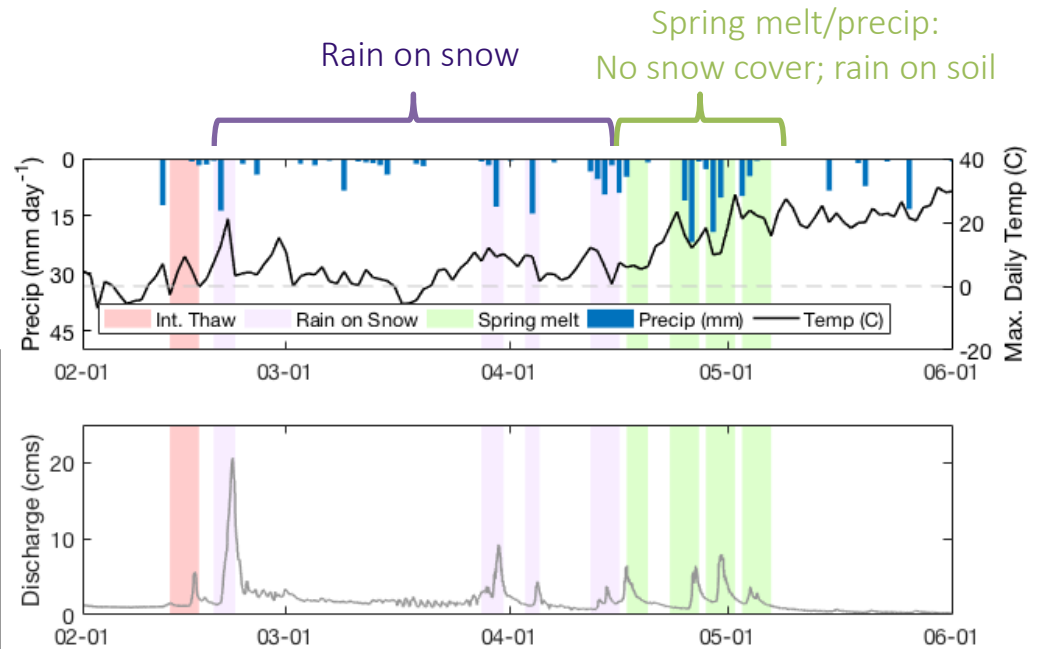
Site and methods



Forested:
Wade Brook



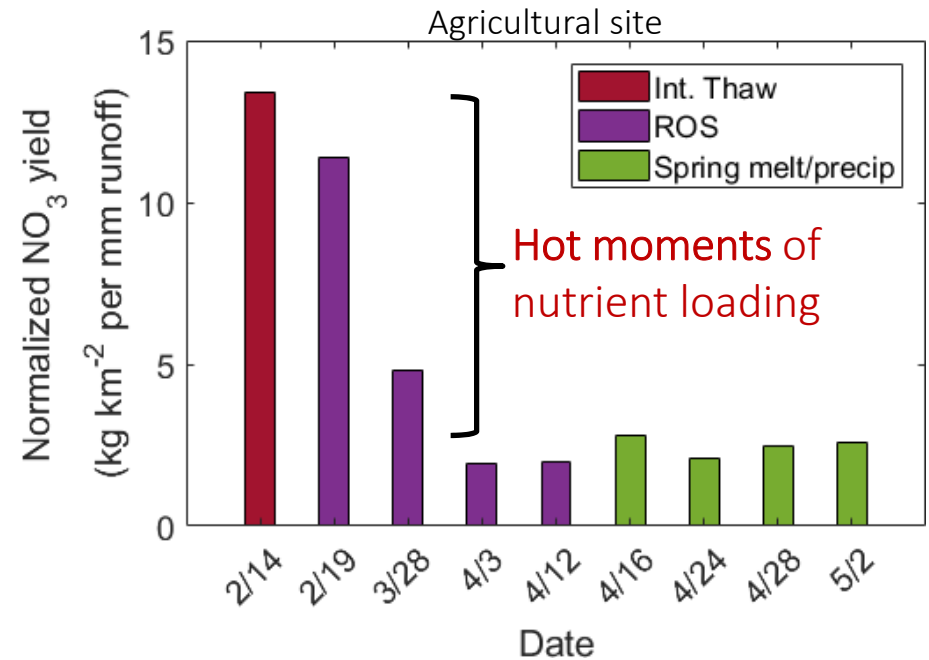
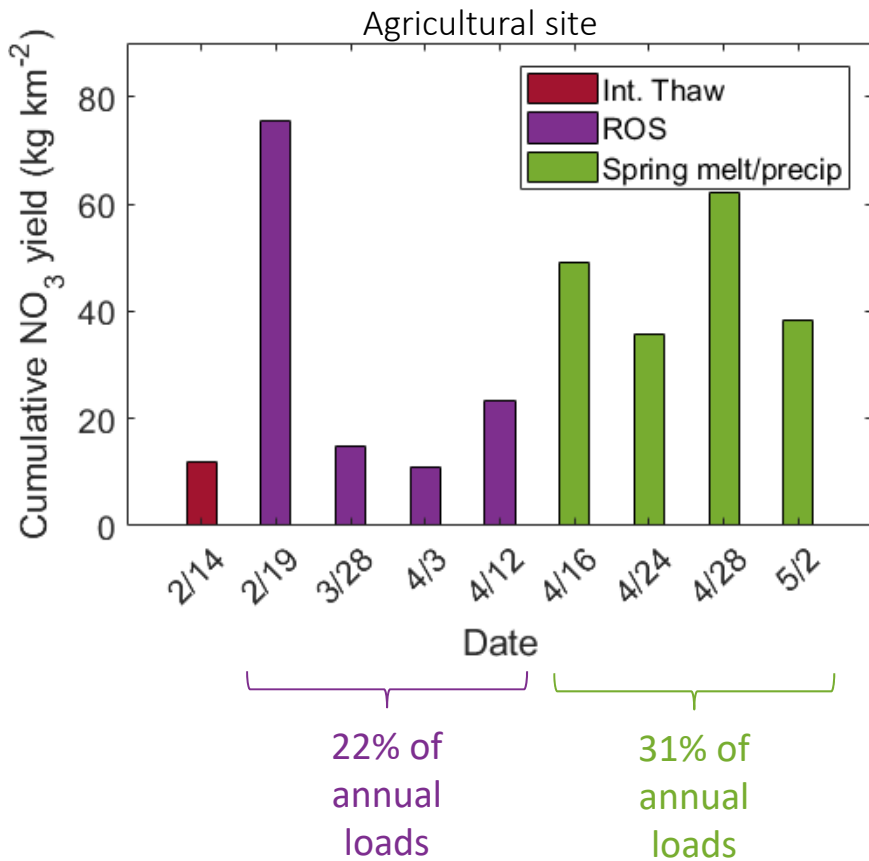
Agricultural:
Hungerford
Brook



- Stream NO₃ and DOC concentrations using ISCO samplers + high frequency sensors (s::can spectrolysers)
- Pre/post event groundwater and soil water sampling
- Event-scale analyses:
 - Cumulative NO₃ and DOC yields
 - Hysteresis to identify runoff generation pathways
- Sampled 9 events in 2018 + 10 events in 2019



ROS events export significant amounts of NO_3



Hysteresis: Comparison to previous studies...

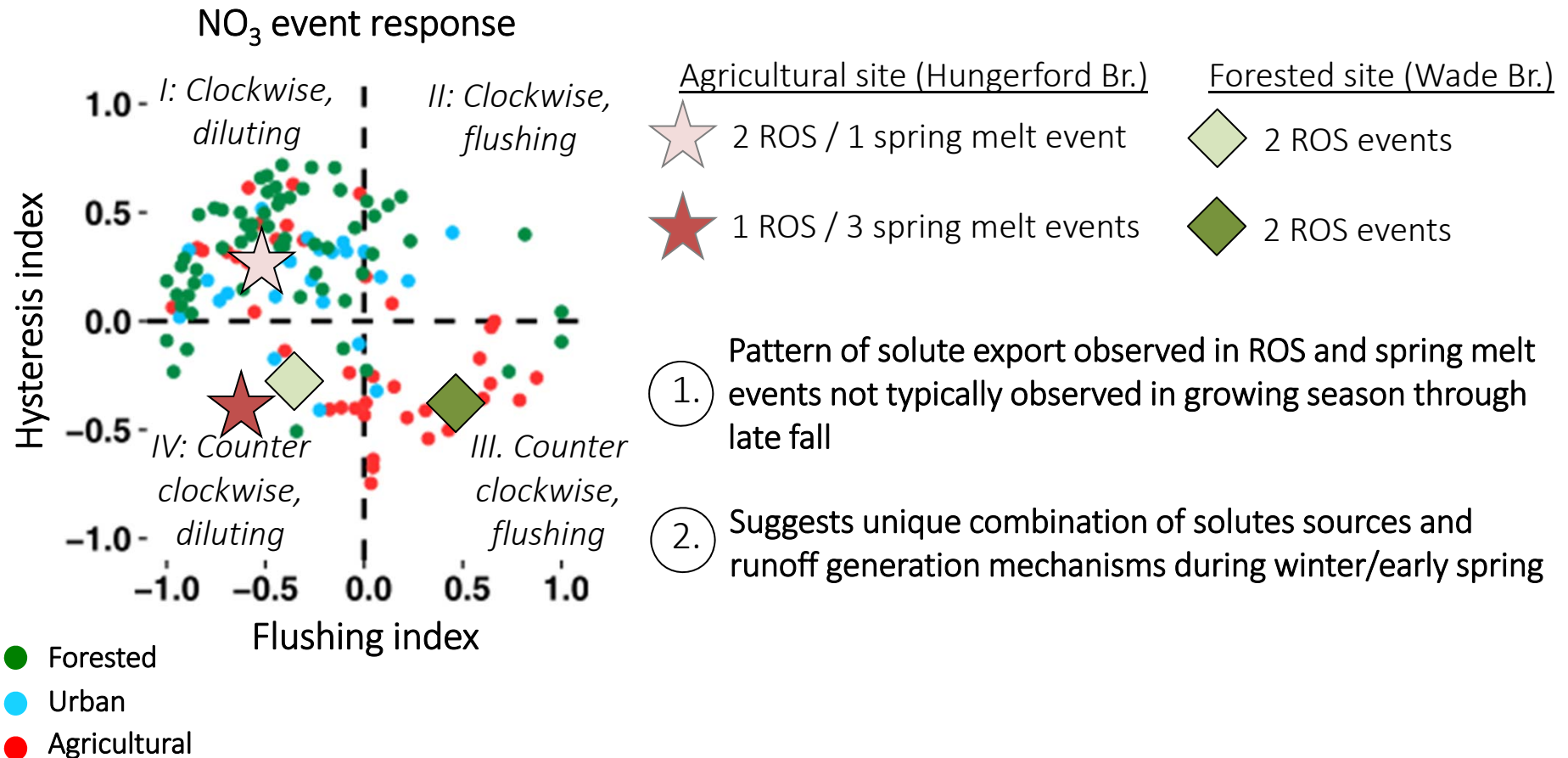
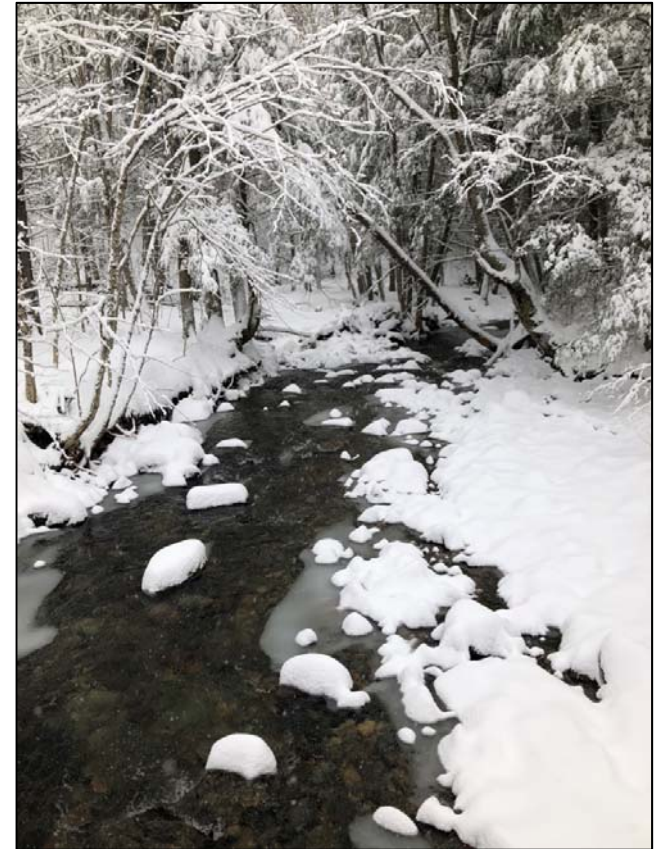


Figure from Vaughan et al. 2017 (WRR)

Effects of ROS?

1. ROS events comprise a **significant component of measured annual NO_3 flux** (~20%)
 - Shifts in timing of downstream NO_3 export → implications for surface water quality?
2. Concentration-discharge relationships for same events suggests **significant interaction with soil water and groundwater pools during ROS events**
3. Greater degree of connectivity between terrestrial and aquatic systems during previously disconnected time of year



Questions?

