Landscape variability

- How do we explain the variability observed between plots?
- Gathered ground penetrating radar (GPR) data of the subsurface and bedrock
- Modeling surface and subsurface water flow paths using GIS and TWI modeling

Flow direction calculated in ArcGIS using the bedrock topography and DEM of the site

Topographic wetness index calculated in ArcGIS using the same GPR and DEM layers

Nitrogen in water and soils

- Where is the NO\textsubscript{3} moving throughout the seasons?
- Higher NO\textsubscript{3} concentrations in 2012
- Fewer precipitation events in spring/summer of 2012
- How can NO\textsubscript{3} loads and concentration data support soil concentrations?
- Greater concentrations in soil NO\textsubscript{3} after corn silage harvest

- Increased soil sampling in 2013
- Seasonal trends and fluctuations in soil NO\textsubscript{3} and NH\textsubscript{4} reflect corn growing season

Integrated Farm System Model

- Increase the scale of analysis
- Investigate environmental losses on an annual bases averaged over 25 years of weather
- Can consider whole farm economics

- Simulated results provide total denitrification losses
- Measured data: N\textsubscript{2}O-N losses
- Volatilization trends similar

- Options to investigate other farm management practices: manure storage and manure application timing and frequency

Economics: similar cost for both strategies