A spatially-distributed phosphorus water-quality model for the linked surface-water/groundwater variable density hydrology of the southern Everglades

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Why model biogeochemistry in the Everglades

- We have to – it’s mandated
- Predicting WQ and consequent ecological consequences of proposed management decisions
- Improve understanding the system
- Generating input data for other models
Making a mechanistic biogeochemical model

• Define the modeling objective
• Understand the real system
• Understand the modeling limitations
• Fix the conceptualization
• Code it
• Calibrate and test
• Rinse and repeat
Choose appropriate complexity for the problem!
Limitations

• My own: “modeling is an art”
• Fix the conceptualization
  – New data?
  – New objective?
  – New biogeochemistry?
• Need a computer nerd to code it
• Hydrodynamics: link it or create it
• Time & Money
Biogeochemical CYCLE
Transport And Reaction Simulation Engine (TARSE)
Limitations

• My own: “modeling is an abstract art”
• Fix Define the conceptualization
  – New data? Optimize
  – New objective? Adapt
  – New biogeochemistry? Redefine
• Need a computer nerd biogeochemist to code it
• Hydrodynamics: link it/create it once
• LESS Time & LESS Money
Opportunities for CERP

- Wide bieogeochemical interests
  - P, N, S, Hg, Pesticides, DOM
- Existing suite of hydrologic models
- Evaluate management scenarios based on water quality
- Better use of data
- Experimentability
- Integrated modeling potential
Coastal Everglades example

Unique hydrology vs unique biogeochemistry
FTLOADDS + TARSE
Summary

- TARSE is a water quality modeling framework
- Puts more control in the hands of the modeler
- Great potential for versatile application
- Coming soon to southern Everglades