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
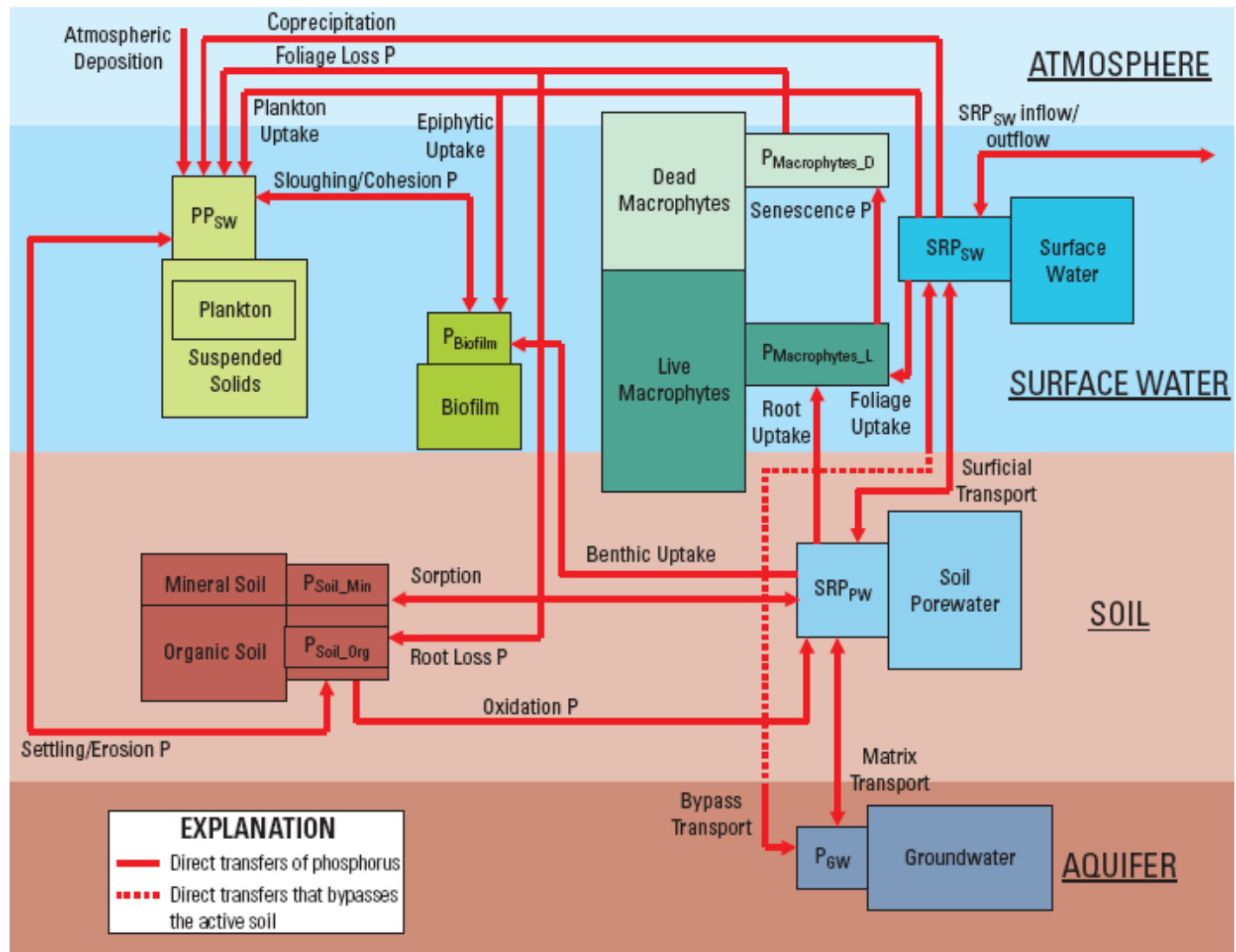- Rinse and repeat

Complexity
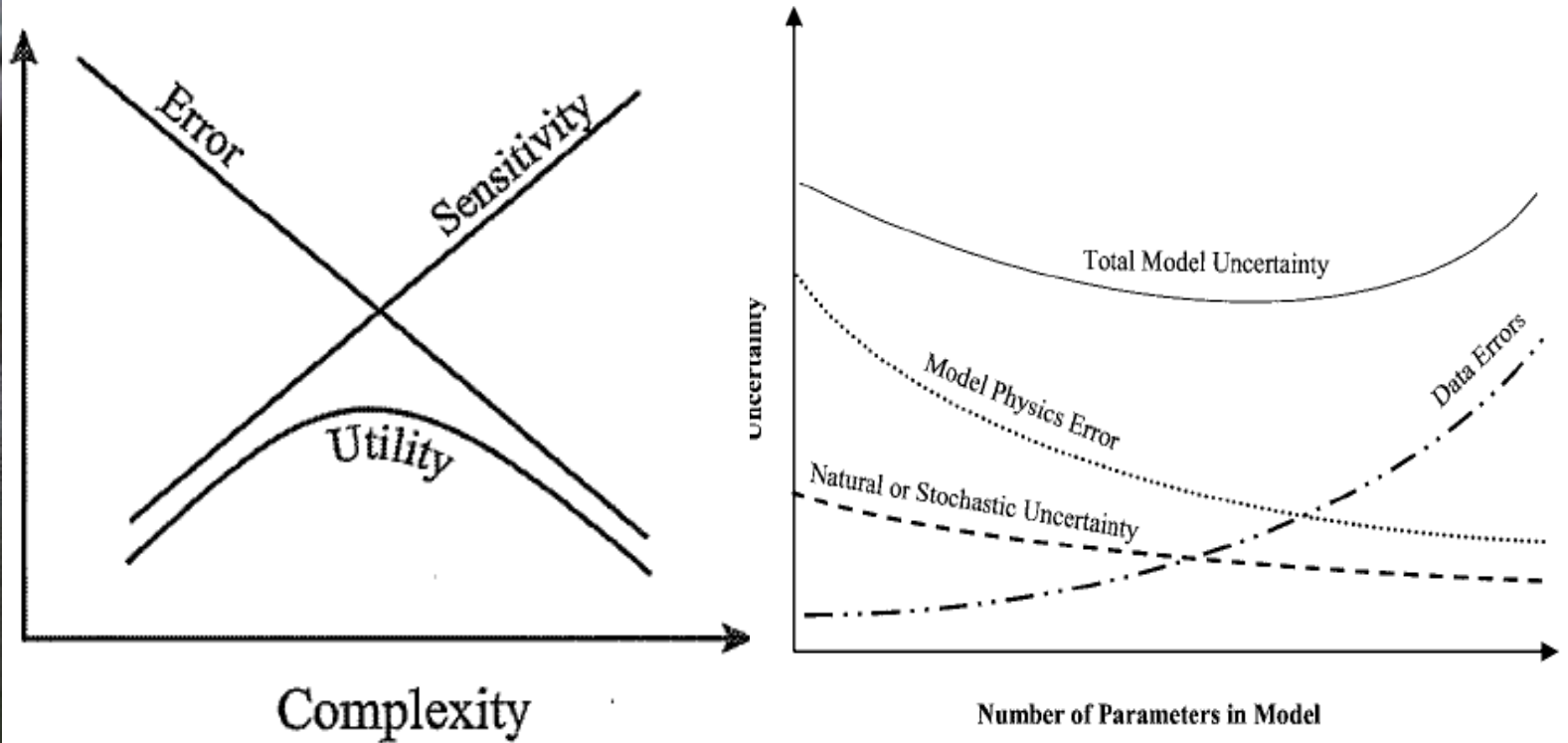
Choose appropriate complexity for the problem!

Limitations

- My own: "modeling is an art"
- Fix the conceptualization
  - New data?
  - New objective?
  - New biogeochemistry?
- Need a computer nerd to code it
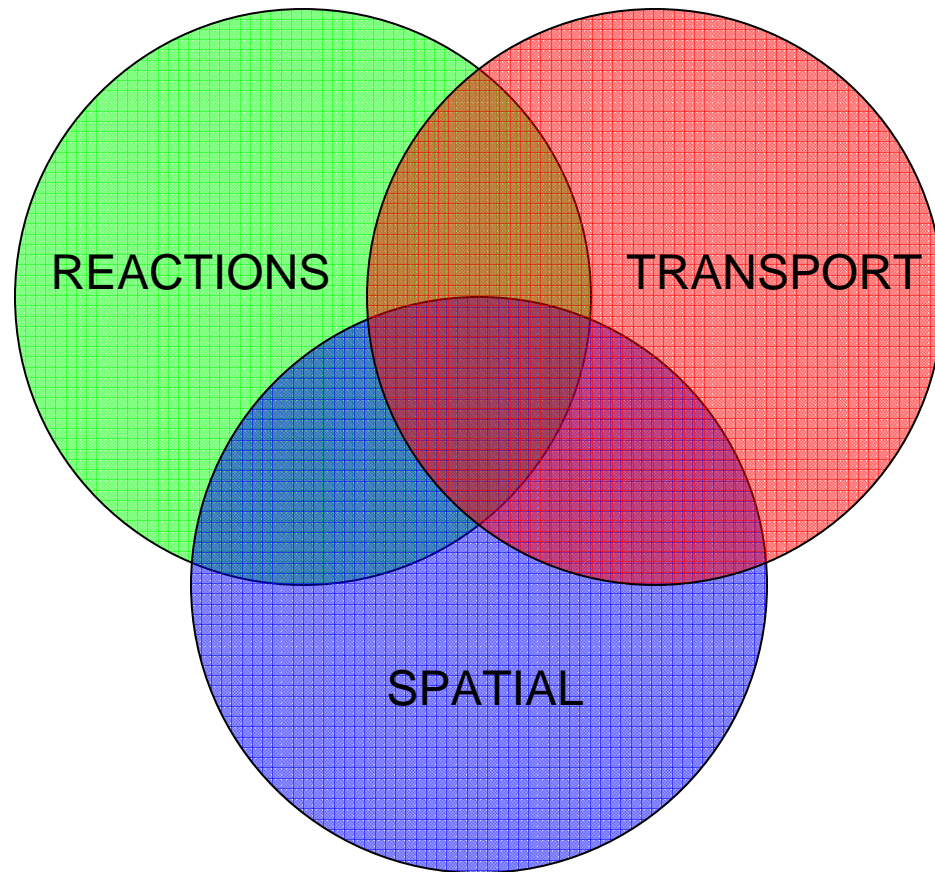- Hydrodynamics: link it or create it
- Time & Money

Biogeochemical **CYCLE**

Transport **A**nd **R**eaction **S**imulation **E**ngine (TARSE)

REACTIONS

TRANSPORT

SPATIAL

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
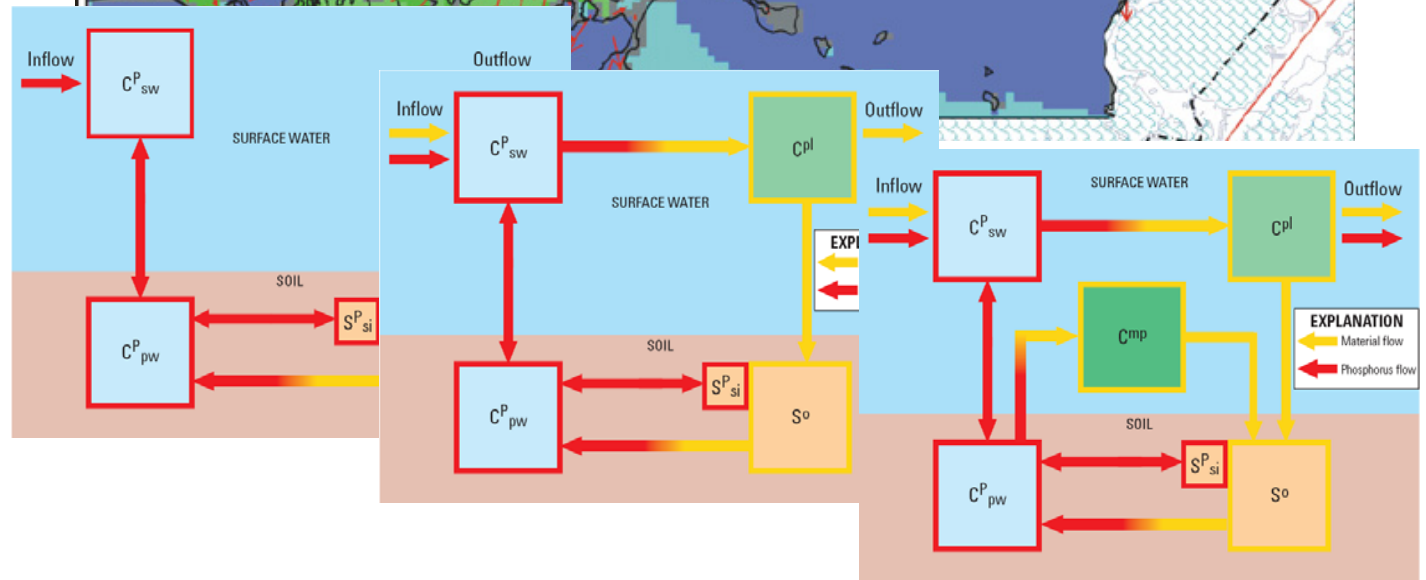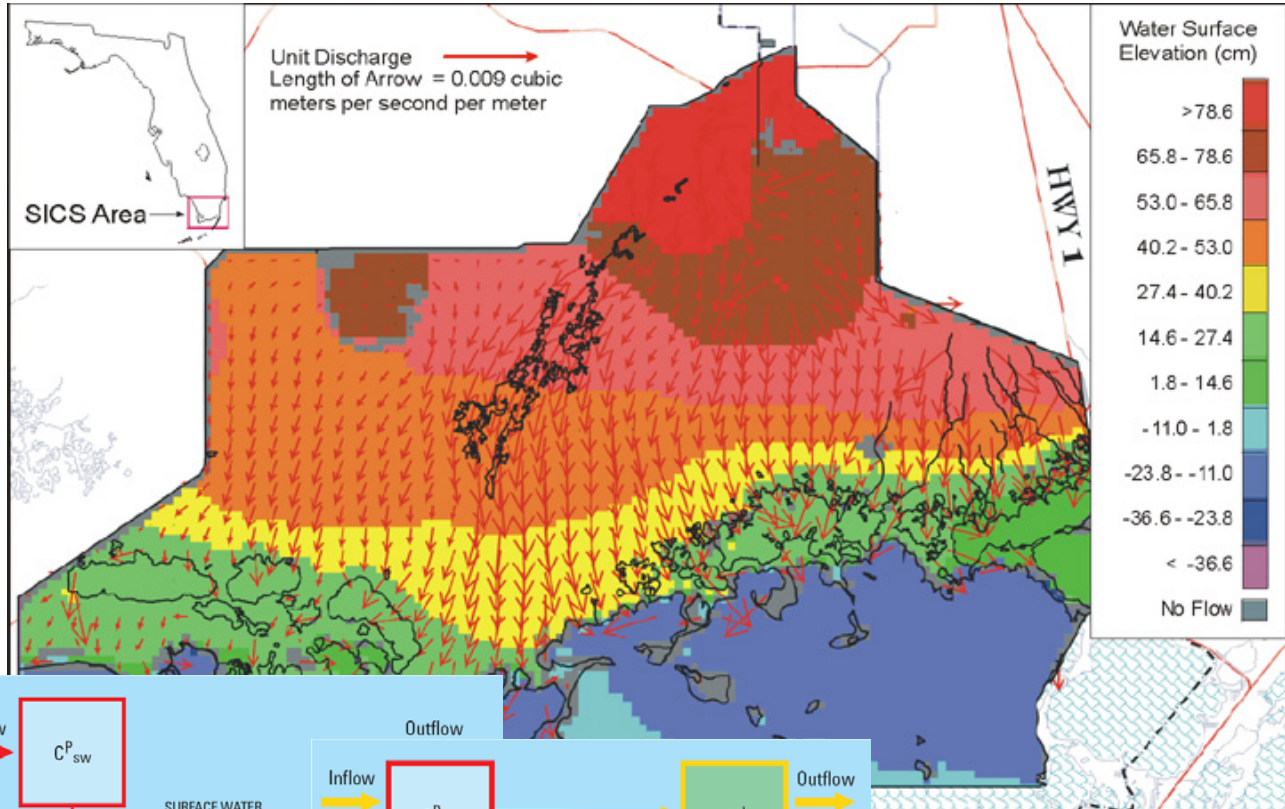- Integrated modeling potential

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