

Modeling to Support Nutrient Criteria Development in the GoM: Monitoring Implications

Gulf Alliance Monitoring Form

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Models Task Team

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- Nancy Wallace - NOAA
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Scope

- Watershed modeling addressed elsewhere
- Box modeling addressed elsewhere
- No expertise in ecosystem simulation modeling (e.g. Ecosim)

SO,

- Hydrodynamic / biogeochemical models
 - E.g. CE-QUAL-ICM, EFDC-WQ, (many others)

CE-QUAL & EFDC variables

- **C**: DOC, POC, (labile and refractory)
- **N**: NO_3 , NH_4 , PON (labile and refractory)
- **P**: Total PO_4 , POP (labile and refractory)
- **Si**: biogenic and available
- **DO**
- **Green algae**, cyanobacteria, diatoms
- **SAV's**, macroalgae, zooplankton, macrobenthos recently(?) added

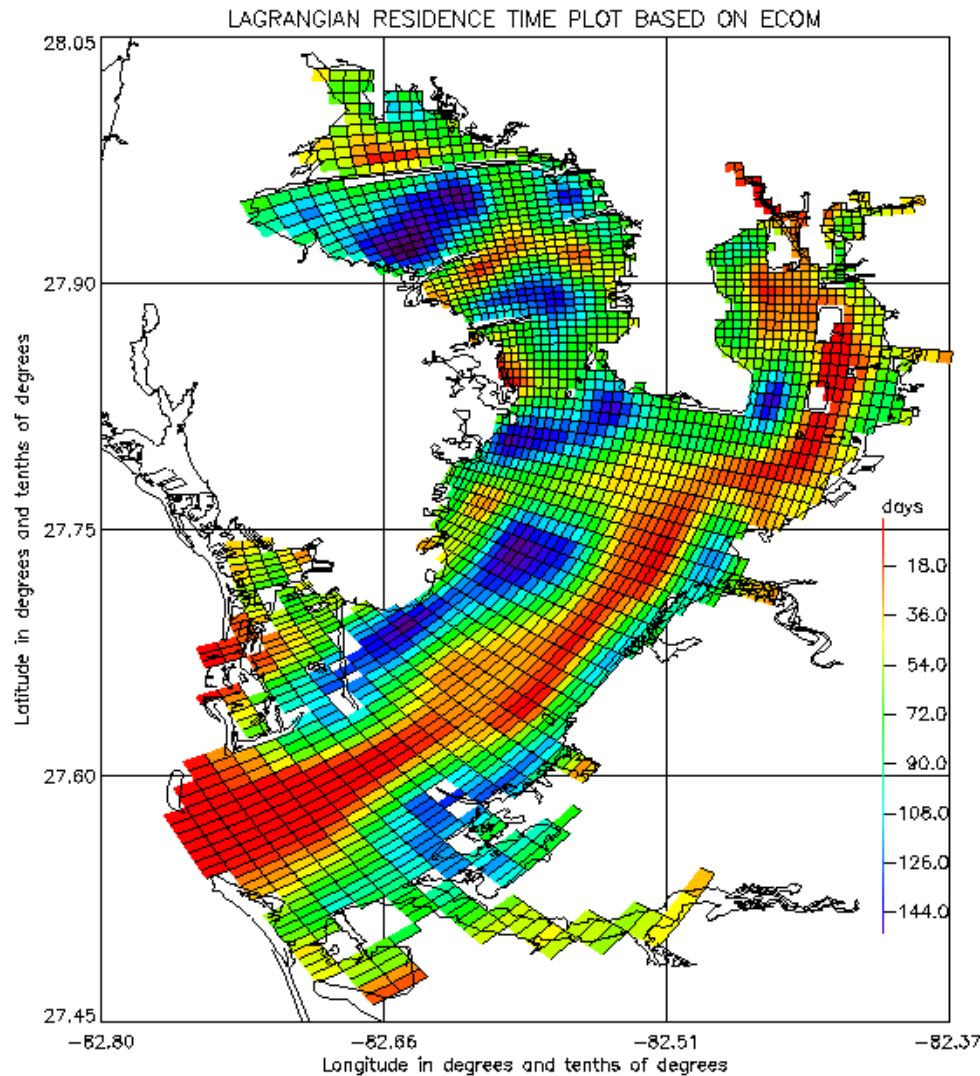
Questions

- What do these models bring to the table?
- What are their data requirements?

Benefits

- Aid in construction of budgets
- Better understanding of system flushing/mixing behavior
- Monitoring system design (OSE's and OSSE's)
- Routine 'monitoring' and forecasting
- Development and testing of management scenarios

Residence time- spatial/temporal variability



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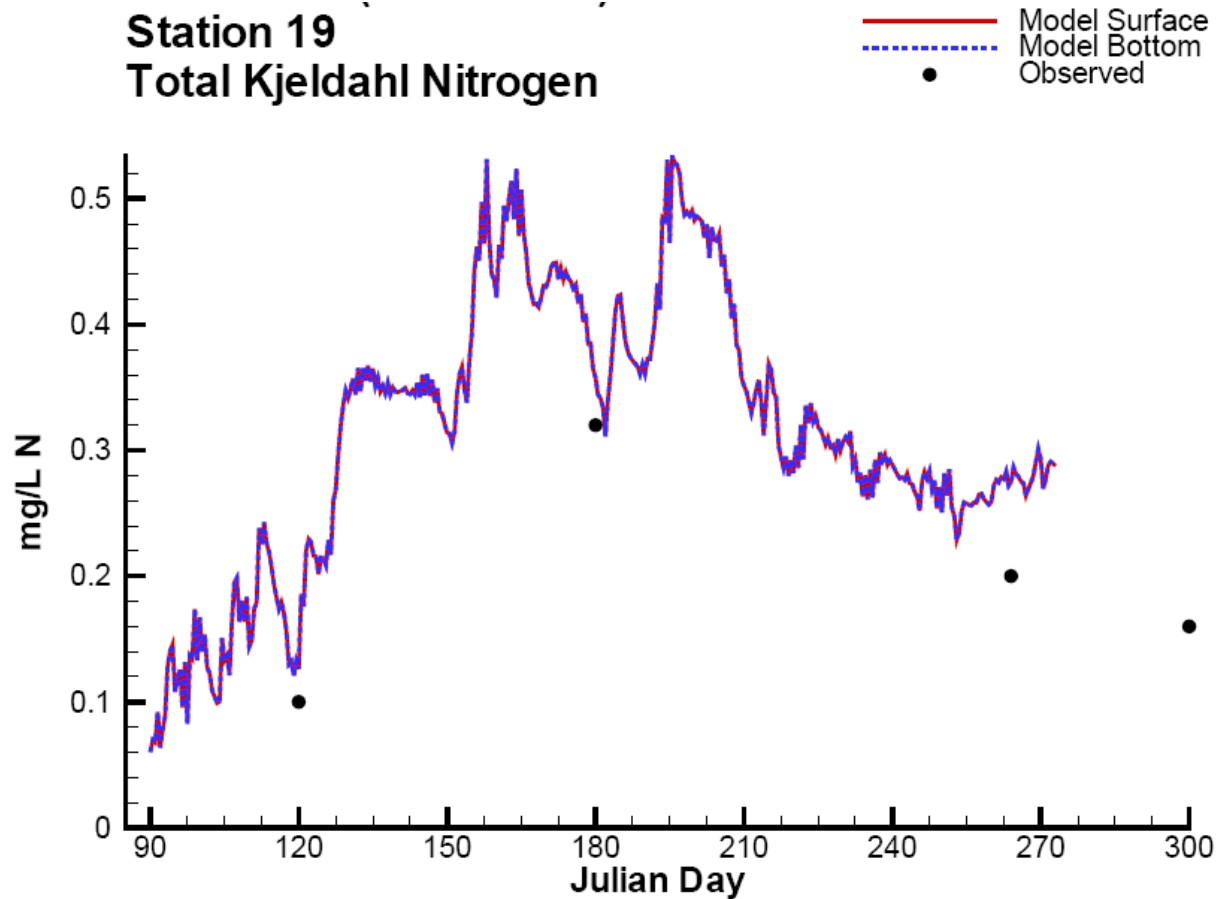
Data needs I - hydrodynamics

<u>Requirement</u>	<u>Location</u>	<u>Frequency</u>	<u>Suggested Sources</u>
<u>1. Model forcing</u>			
<u>Freshwater inflow</u>	<u>Major tributaries</u>	<u>daily</u>	<u>USGS, USACE</u>
<u>Water surface elevation</u>	<u>Model open boundary</u>	<u>hourly</u>	<u>Regional tide model or tidal constituents</u>
<u>Temperature and salinity profiles</u>	<u>Model open boundary</u>	<u>hourly - daily</u>	<u>Regional model</u>
<u>Meteorological (wind, heat flux, precip, cloudiness)</u>	<u>Model interior</u>	<u>hourly</u>	<u>NOAA</u>
<u>2. Model cal/val</u>			
<u>Water surface elevation</u>	<u>Model interior, several sites</u>	<u>hourly</u>	<u>Pressure sensor on fixed station, tide gage</u>
<u>Temperature and salinity</u>	<u>Model interior, several sites</u>	<u>hourly - daily</u>	<u>Fixed station (for surface), regular boat surveys</u>

Data needs II - biogeochemistry

<u>Requirement</u>	<u>Location</u>	<u>Frequency</u>	<u>Suggested Sources</u>
<u>1. Model forcing</u>			
<u>Flux in freshwater input (all species that are being modeled)</u>	<u>Major tributaries</u>	<u>Daily - monthly</u>	
<u>Air-sea flux (?)</u>			
<u>2. Model cal/val</u>			
<u>Water column (surface & bottom)</u>	<u>Model interior, several sites</u>	<u>Weekly-monthly</u>	
<u>Fluxes to sediment</u>	<u>Model interior, several sites</u>	<u>Monthly?</u>	<u>Sediment grab samples; sediment trap</u>

Model-data impedance mismatch



Input from you?

- Add, delete, or comment on benefits discussed
- What is the role of data assimilation here?
- How to measure and characterize uncertainty?

Backup slides...
