

JACKSONVILLE HARBOR DEEPENING STUDY

WATER QUALITY MODELING

Presented by:

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October 22, 2012



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USACE EFDC-CEQUAL-ICM Model Mesh

- model domain comprises 2,707 curvilinear horizontal water cells
- six equally divided layers in the vertical direction
- model variables are
 - ▶ water surface elevation
 - ▶ velocity
 - ▶ salinity

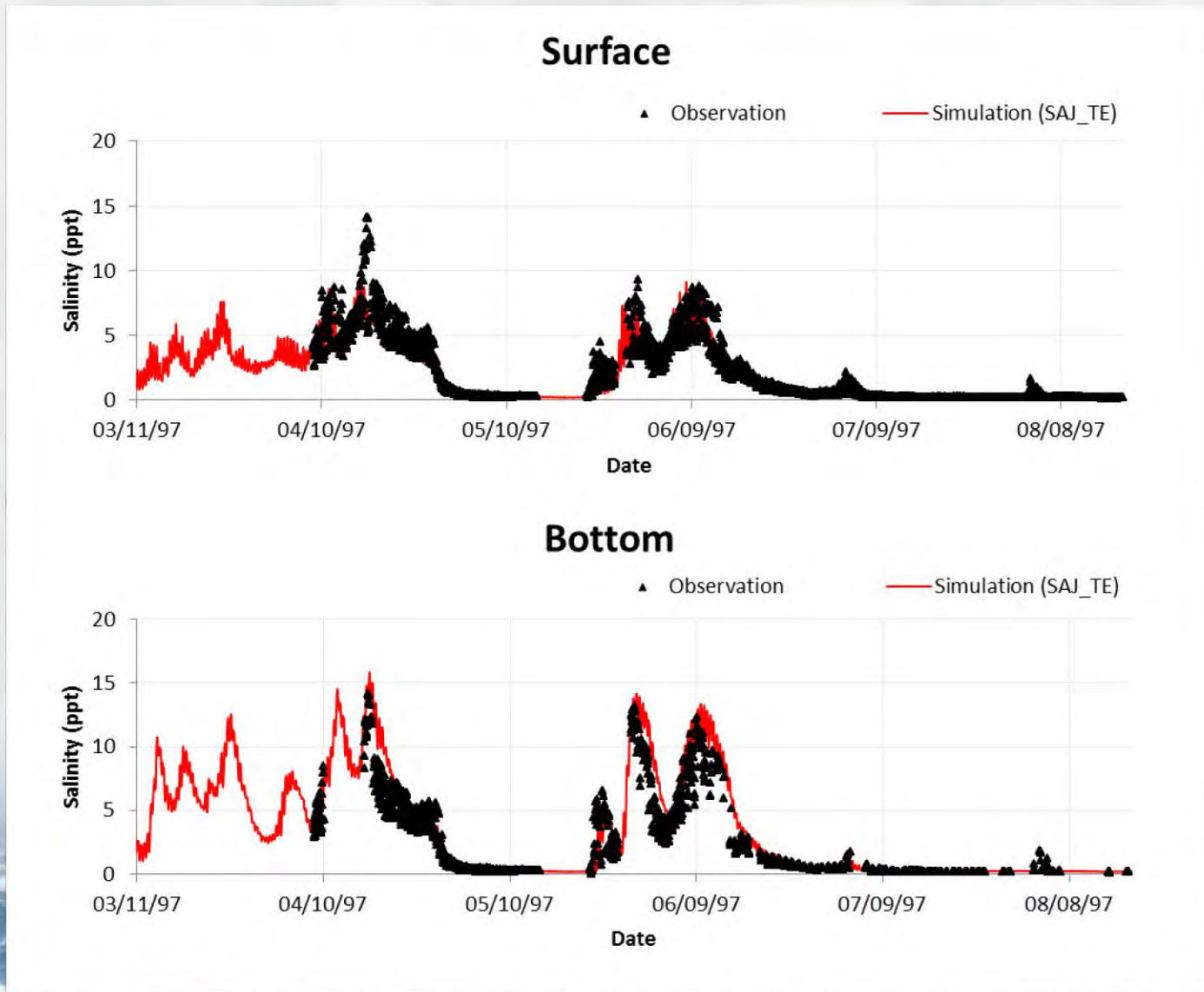


EFDC Model Calibration (Salinity)

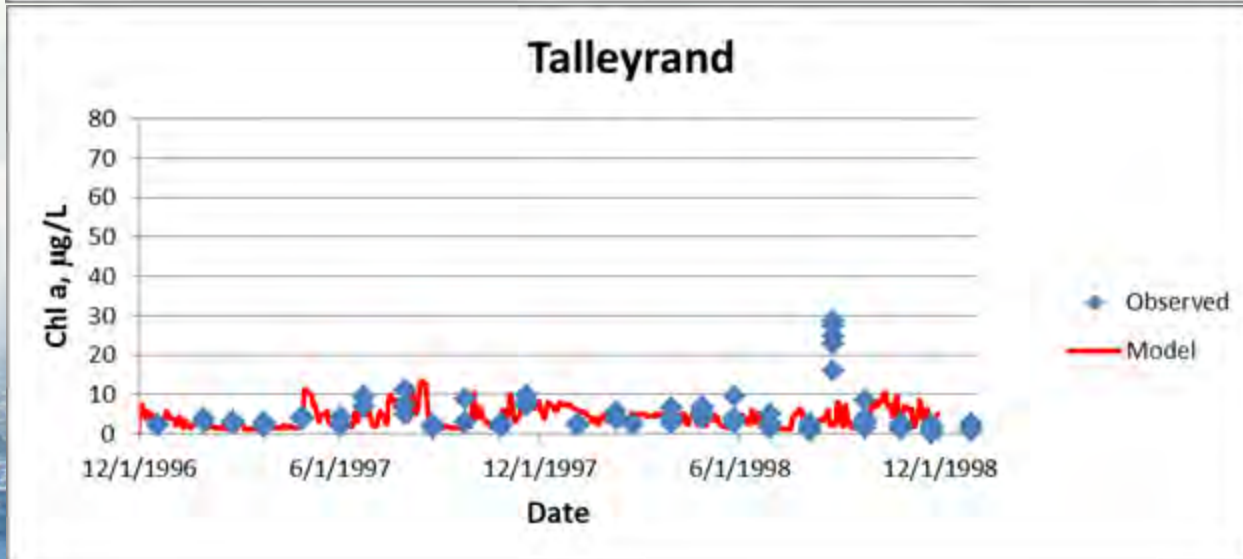
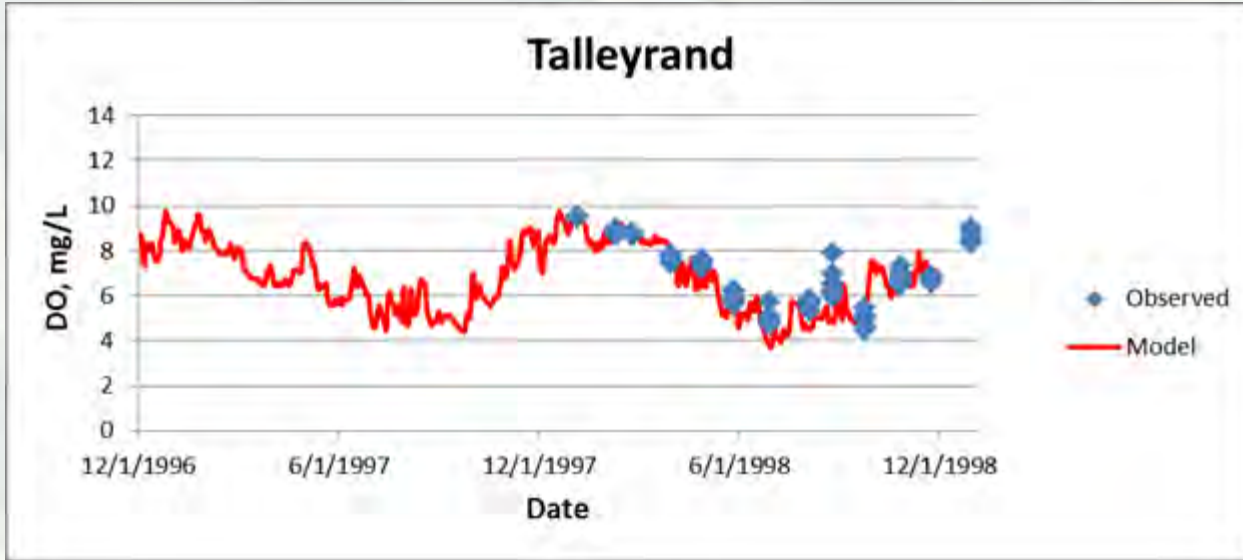
| Stations | Calibration Period (1997) | | Verification Period (1998) | |
|-----------------------------|------------------------------|---------------|-------------------------------|---------------|
| | Correlation Coefficient | RMSE (ppt) | Correlation Coefficient | RMSE (ppt) |
| Dames Point (Surface) | 0.911 | 2.686 | 0.948 | 2.385 |
| Dames Point (Bottom) | 0.874 | 4.105 | 0.883 | 3.896 |
| Acosta Bridge (Surface) | 0.899 | 2.113 | 0.972 | 1.099 |
| Acosta Bridge (Bottom) | 0.886 | 2.433 | 0.974 | 1.033 |
| Buckman Bridge (Surface) | 0.787 | 0.986 | 0.898 | 0.419 |
| Buckman Bridge (Bottom) | 0.962 | 1.250 | 0.850 | 0.538 |

- Correlation Coefficient — ability to predict trend (~ 1.0 for perfect model)
- RMSE — indication of model accuracy (~0.0 for perfect model)

EFDC Model Calibration (Buckman Br.)

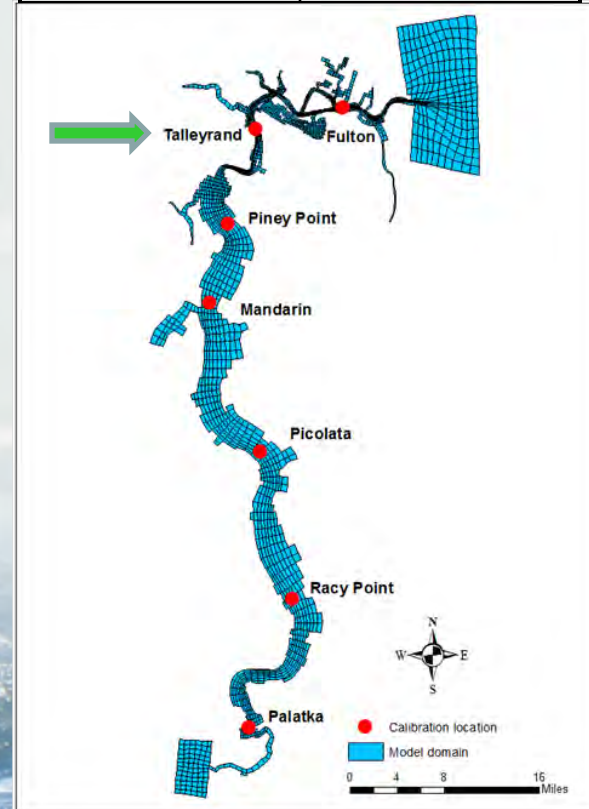


CE-QUAL-ICM Model Calibration

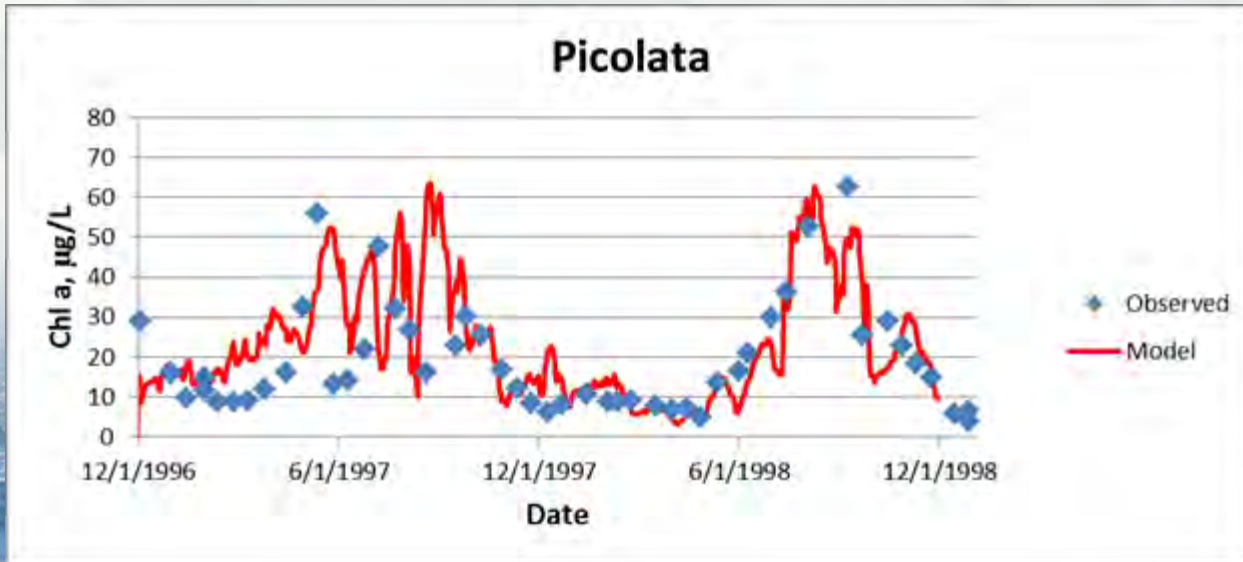
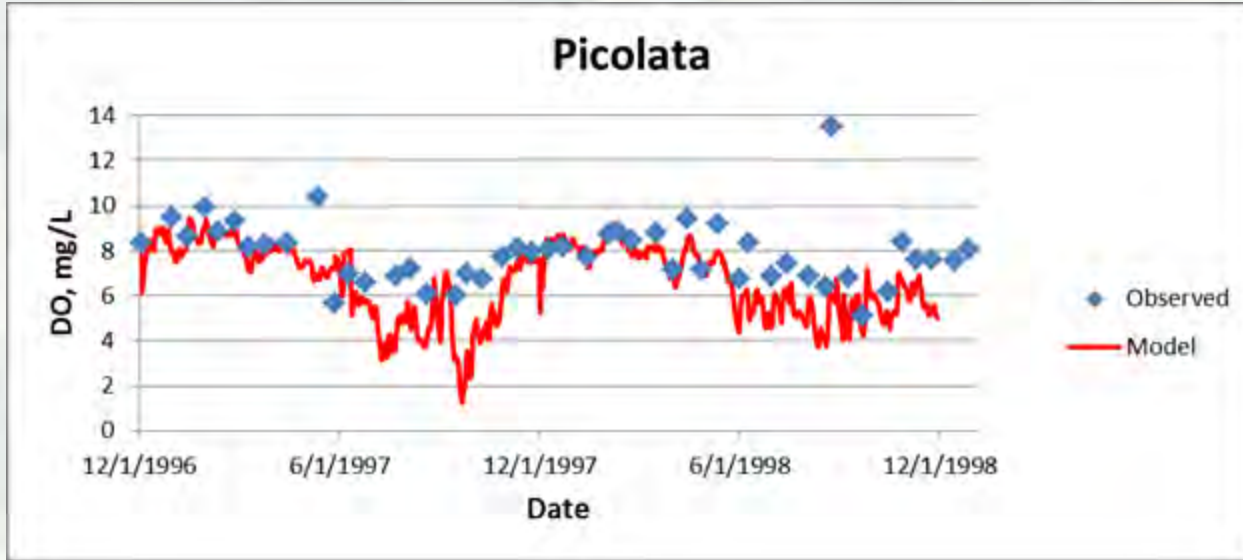


| DO Statistic | Refined-Grid Model |
|----------------|--------------------|
| R ² | 0.61 |
| RMSE, mg/L | 1.11 |

| Chl-a Statistic | Refined-Grid Model |
|-----------------|--------------------|
| R ² | 0.50 |
| RMSE, µg/L | 11.49 |

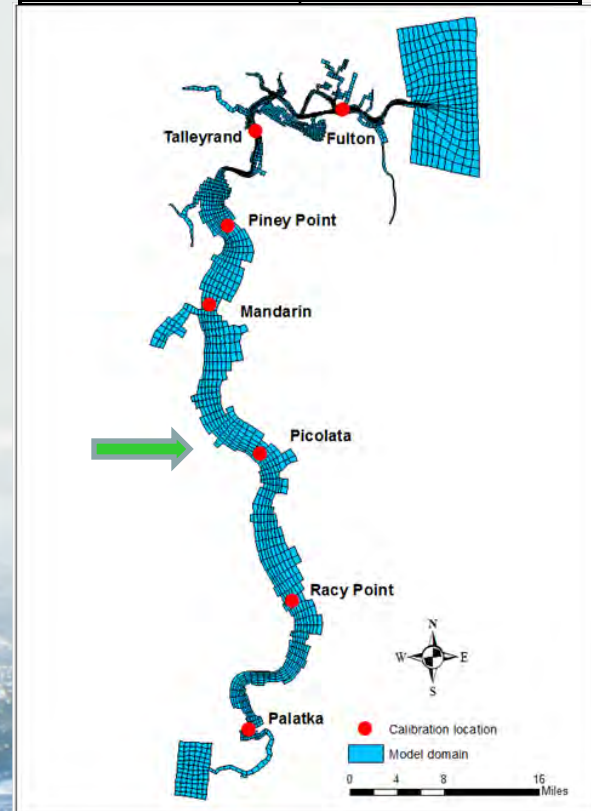


CE-QUAL-ICM Model Calibration



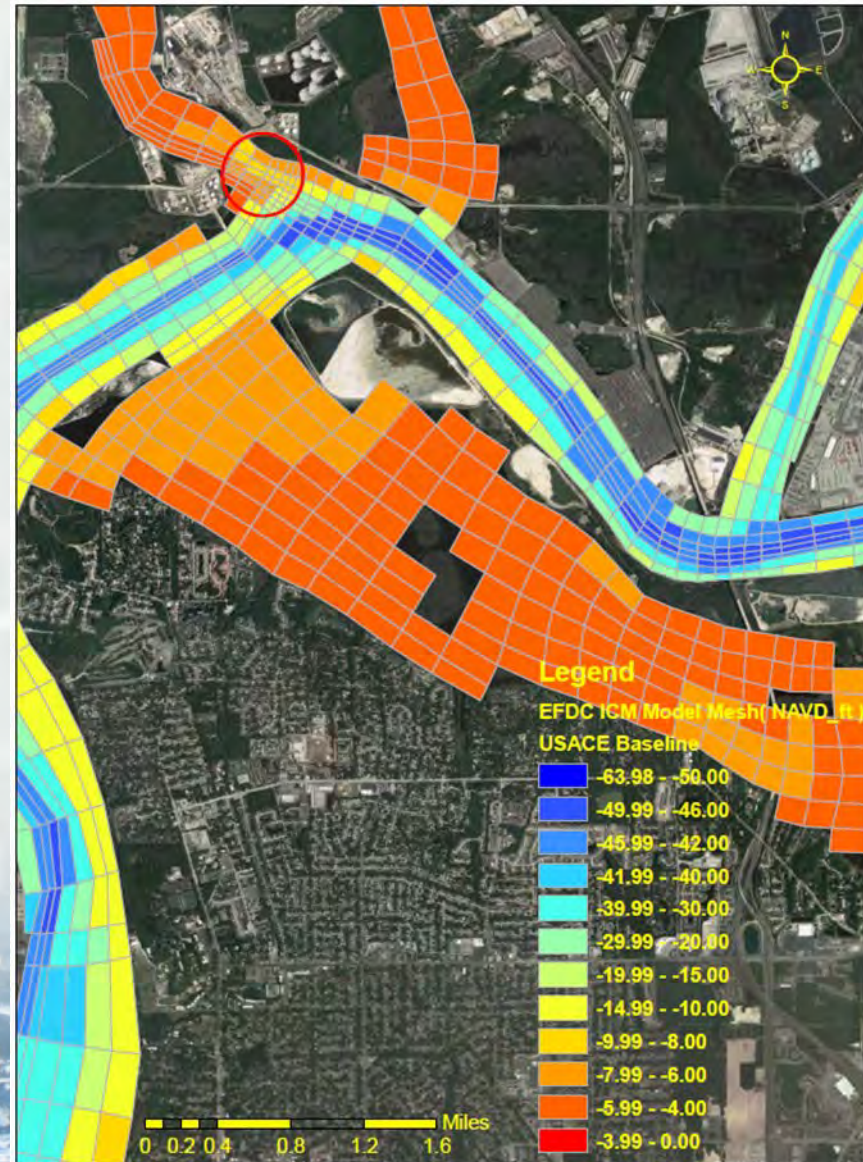
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Model Challenges

- Production Runs
 - ▶ USACE Baseline
 - ▶ 50-ft dredge
- EFDC-TMDL model has model instabilities for production runs
- Model re-runs with smaller time steps



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Discussion