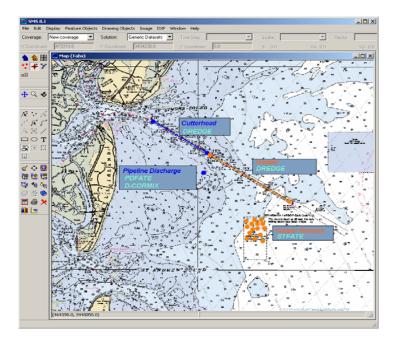
Surface Water Modeling System (SMS) Toolbox for Dredging Models and Data

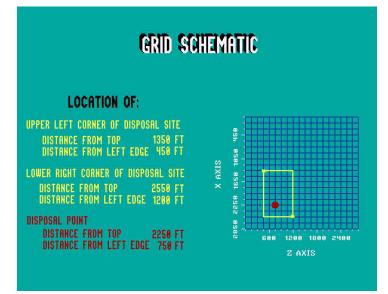
Joseph Gailani Joe.Z.Gailani@usace.army.mil

Motivation/Solution

MOTIVATION:

- Dredging models are stand alone
- Inefficient and time consuming to set up models, incorporate data sources, process output
- Powerful models under-utilized due to lack of interconnectivity

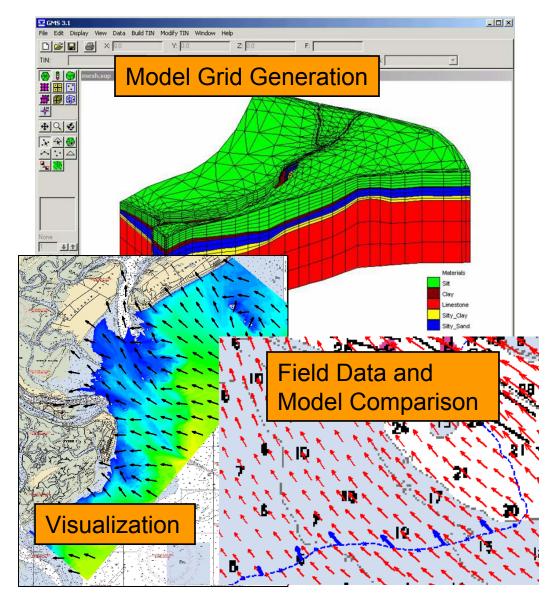




SOLUTION:

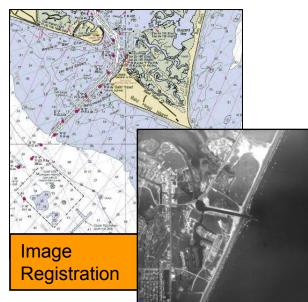
- Incorporate dredging models and data sources into Corps-supported data/model mgmt system (SMS)
- Interconnect dredging and other Corps models/tools/databases
- Develop system for rapid dredge data integration, analysis, visualization

SMS Model & Data Mgmt



- Includes Corps hydro, wave, WQ, watershed, water resource, and groundwater models
- Used for: grid generation, model setup, visualization, post-processing,
- Interaction between models
- Incorporate data from multiple sources: GIS, time series, etc.
- Interconnectivity to web-based data sources
- Data analysis and interpolation tools
- Common data input include
 - Bathymetry and boundaries
 - Structures
 - Hydrodynamic and wave data
 - Sediment
 - Water Chemistry
 - Resources
 - Dredge data/schedule
 - Time series

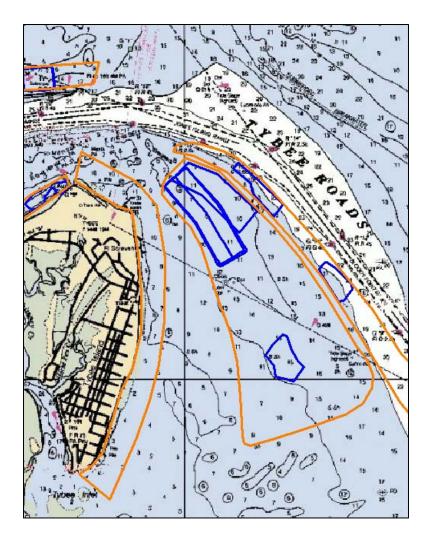
SMS Georeferencing



- Data sources are diverse and no standard coordinate system exists
- SMS tool: Georeference data sources and model output
- Coordinate conversion
- GIS shape files
 - Import
 - Create
- Image registration
 - NOAA maps
 - Google Earth Images
 - Other Aerial Photography and maps

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Dredging Toolbox in SMS



Approach: Provide Dredging Project Staff with:

- Comprehensive management system for models and data
- Interconnectivity with other Corps models (hydro, waves, etc)
- Efficient connectivity to external data sources
- Dredge-specific databases
- Interconnectivity between dredging models
- Efficient model setup
- Visualization and analysis tools

Dredging Toolbox in SMS

| Fate Vessel | | |
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| 40-45 Long Island | Length (ft) | |
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| Vessel 6 | Width (ft) 64.0 | |
| | Number of Bins 1 | |
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- Tools currently in SMS
 - STFATE
 - Dredge Database
 - PTM
 - Dredging Source Models
 - Analysis tools
- Tools presently being incorporated (FY08)
 - MPFATE
 - LTFATE
- Beyond 2008
 - Additional databases
 - Additional analysis tools
 - PTM-WQ

STFATE in SMS

Cancel

0K.

| FATE M | lodel Control | | | | | | | | | |
|--------|---------------------------|----------------------|------------------------|--------------------|--------------|----------------|-----------------|---------------|------------|---|
| Genera | I Coefficients Water | Density Tracer / C | Constituent Output Cur | rent MK Placem | ent | 1 | | | | |
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| | Write out collapse phas | e results | | | | | | | | |
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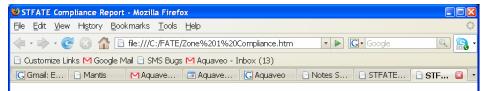
*measured counter-clockwise from positive I direction of grid

Help..

- GUI for Model Setup
 - Lead user through model input windows
 - Provide/indicate data sources for model input
 - Execute model
 - Display model output
 - Provide data reports

| Loading | Layers | | | |
|----------------|---------|---|-------------------------------------|-----------|
| Load 1 | Layer | | Volume (yd^3) | |
| | Layer 1 | | 2000.0 | Sediments |
| | Add L | .ayer | | Sediments |
| Select Vessel, | | | | |
| | | | | |
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STFATE in SMS



STFATE Compliance Report

Requirements

- A. Concentrations must not exceed the threshold concentration outside the site boundary.
- B. Concentrations can only exceed the threshold concentration inside the site boundary for a period of 4 hours following the placement.

Threshold Concentrations

| Material | Concentration |
|----------|-----------------|
| clay | 0.07000000298 |
| lead | 0.0099999997765 |

Simulation Results

| Simulation | Meets Requirement | | |
|------------|-------------------|-----|-------|
| | A | В | A & B |
| placement1 | Yes | Yes | Yes |
| placement2 | No | Yes | No |

Maximum Concentrations Outside Site

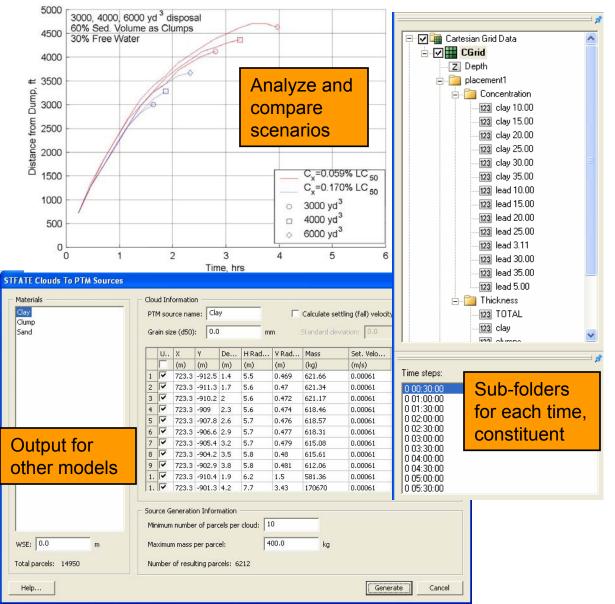
| | clay | lead |
|------------|-----------|-------------|
| placement1 | 0.0649035 | 0.000127619 |
| placement2 | 270.925 | 0.00112605 |

Maximum Concentrations Within Site After 4 Hours

| | clay | lead |
|------------|------|-------------|
| placement1 | 0 | 0.000115822 |
| placement2 | 0 | 0.000115822 |

- Data Reports and stored data
 - Html data report
 - Color coded for compliance
 - Automatically replaced, if desired when new simulation performed
 - Save model input for easy modification of scenario
 - All output saved for further analysis
 - Output formatted for input to far-field transport models

STFATE in SMS



- Data analysis tools
- Scenario comparison tools
- Create input files for far-field models
- Save at each timestep
- Sub-folders for each cloud at each timestep
- Sub-folders for deposition

PTM in SMS

- Lagrangian Particle Tracking model for predicting fate of sediment and constituent from multiple sources
- Sources often derived from other dredging models (STFATE, MPFATE, LTFATE, Dredging Source)
- Computationally efficient for multiple scenarios
- Widely applied for dredging operations
- Subject of next presentation

Benefits to User

- Connectivity to most digital data, including maps and photographs
- Connectivity to other models
- Decreased time needed for CSM and model scenario development
- Increased time efficiency and product quality for model applications
- Increased performance of modelderived lines of evidence through improved input, calibration and validation
- Powerful array of data analysis and interpolation tools
- Improved communication of results (data analysis conclusions) through improved visualization and analysis tools

