

Overview of the SMS Interface for the CMS and New CIRP Additions: **CIRP Wiki and CMS Discussion List**

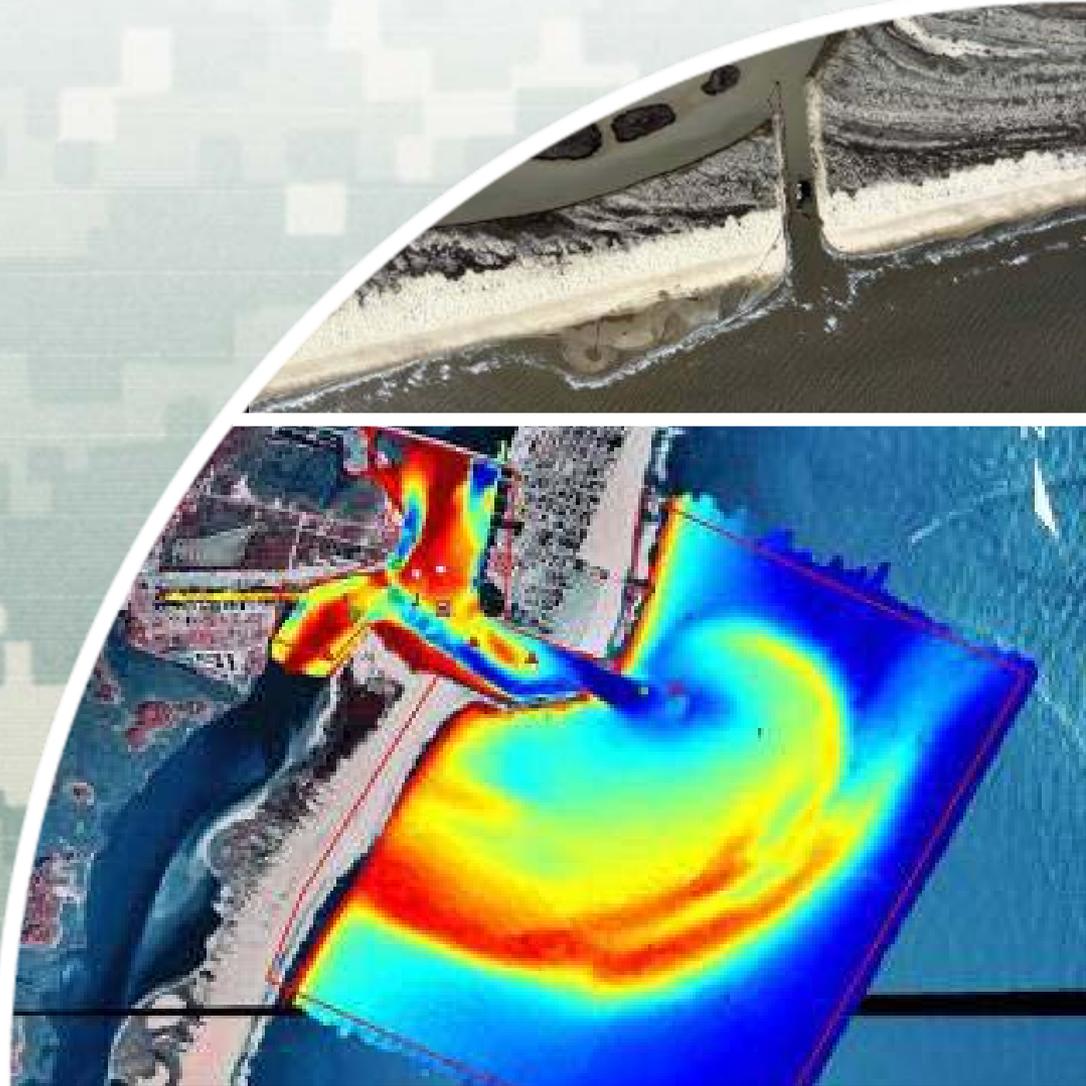


Mitchell Brown

Coastal and Hydraulics Laboratory

Engineer Research and Development Center

December 1, 2009



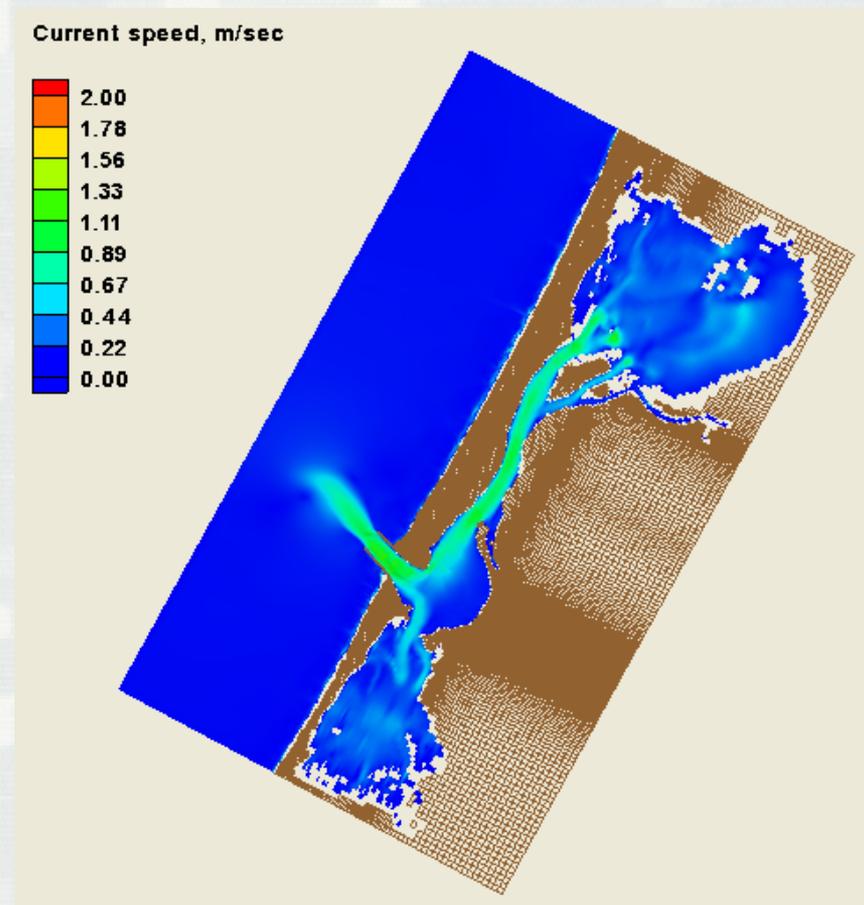
US Army Corps of Engineers
BUILDING STRONG[®]



Outline



- What is the SMS?
- Overview of SMS interface
- CMS-Flow Interface
- CMS-Wave Interface
- What's new in SMS 10.1
- New CIRP Info-Products





1. What is the SMS?



- **A Pre-Processor**
 - ▶ Organize and create input files for Corps of Engineers' Numerical Models
- **A Post-Processor (visualize results)**
 - ▶ Create plots
 - ▶ Create film loops
 - ▶ Data calculator
 - ▶ Dataset creation
- **Connect with outside tools**
 - ▶ Import/export CAD data
 - ▶ Import/export GIS data
 - ▶ Import/export tabular ASCII data
 - ▶ Import/export image data





2. Overview of SMS interface



The SMS interface is modular. Separate [modules](#) pertain to each data type. As the user switches from one module to another, the [menus](#) and [tools](#) change. Inside the modules, the user associates a numerical model with a mesh or grid. When that grid is active, the tools and menus for the associated model are also enabled.

The SMS screen includes several [toolbars](#), [edit fields](#), and [menus](#). Some of these change as the user switches [modules](#) or [numerical models](#). The principal components include:

- [Menu Bar](#) - Menu to issue commands. These change as the module and model change.
- [Edit Window](#) - Fields directly below the menu bar showing the coordinates and function values for selected entities.
- [Graphics Window](#) - Display panel to show the data being manipulated.
- [Project Explorer \(Data Tree\)](#) - Tree representation of data currently referenced through SMS.
- [Time Step Window](#) – Appears if transient data are available.
- [Toolbars](#) - Several toolbars can be displayed. For more information on each toolbar, see the [Toolbars](#) article.
- [Help or Status Window](#)

The toolbars, project explorer, time steps window, and edit window are dockable windows. Dockable windows may be positioned by the user.

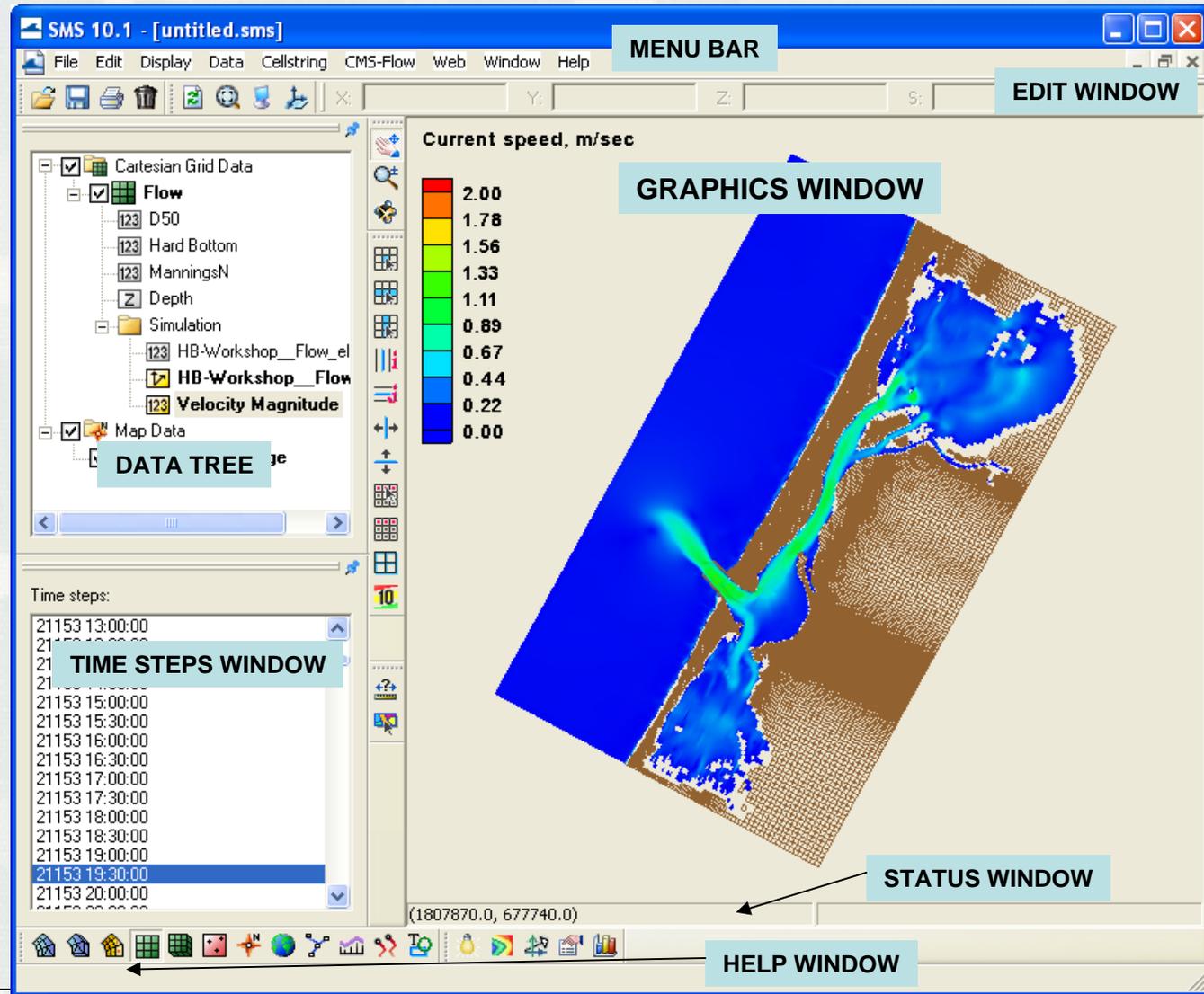


Windows



The Data Tree (also referred to as the "Project Explorer") is a dockable window that appears by default on the left side of the SMS screen.

This window displays a hierarchical tree structure representing all data currently being managed in an SMS simulation.



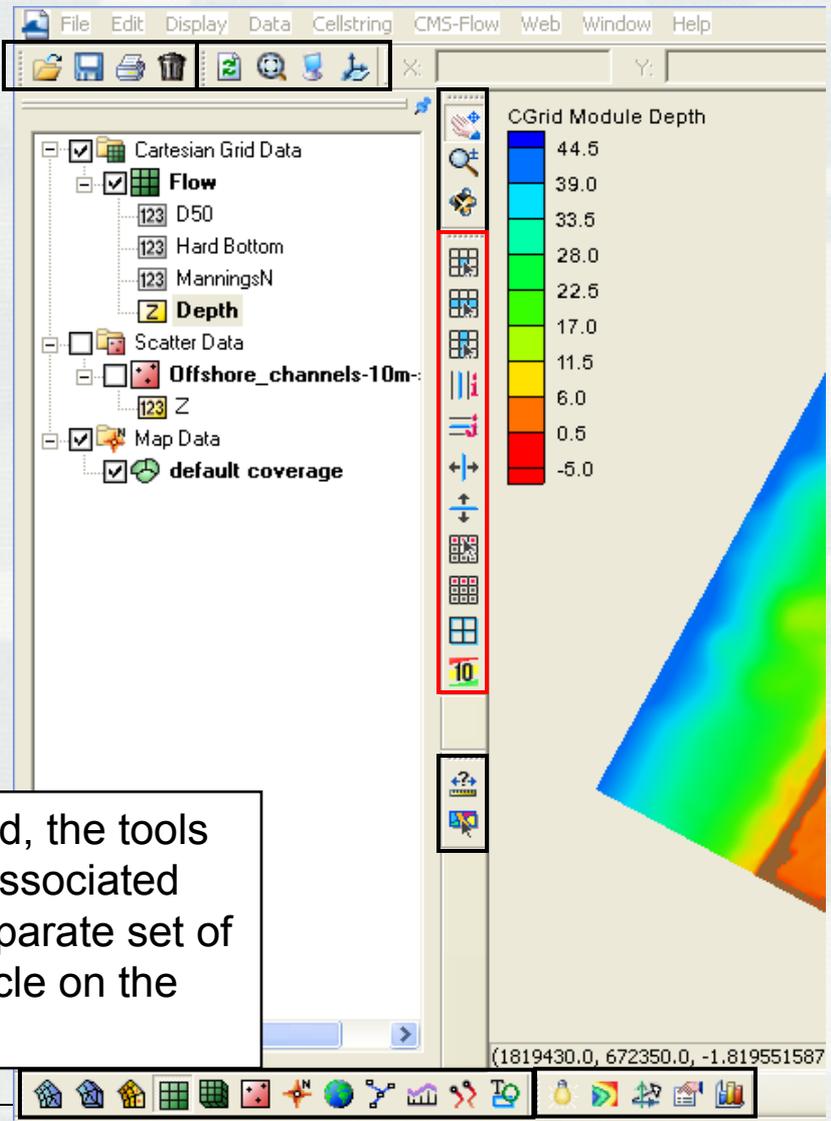


Toolbars



Toolbars

- Static Toolbar 
- **Dynamic Toolbar**** 
- Module Toolbar 
- Data Toolbar 
- Optional Toolbars
 - Macro 
 - File 
 - Display 



Dynamic Toolbar** - When the active module is changed, the tools in the Dynamic Tool Palette change to the set of tools associated with the selected object/module. Each module has a separate set of tools. For more information, see the [Dynamic Tools](http://www.xmswiki.com/xms/SMS:Toolbars) article on the SMS Wiki page. <http://www.xmswiki.com/xms/SMS:Toolbars>



Tools

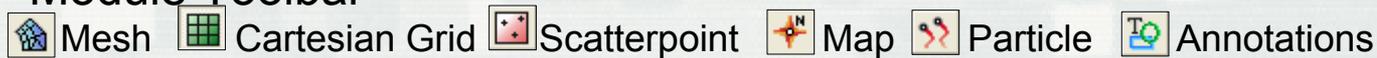


Individual Tools

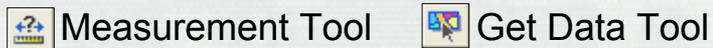
- Static Toolbar



- Module Toolbar



- Data Toolbar



- Optional Toolbars

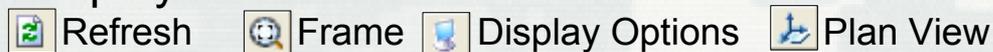
- Macro



- File



- Display

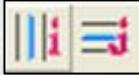
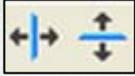




Dynamic Toolbar



Cartesian Grid tools

- Select Cell, Row, and Column 
- Split Column and Row 
- Move Column and Row Edges 
- Select and Create Cellstrings 
- Create Grid Frame 
- Apply Contour Labels 

Scatter Data tools

- Select and Create Point 
- Select and Create Breakline 
- Select and Create Triangle 
- Flip Triangle Edge 

Map Data Tools

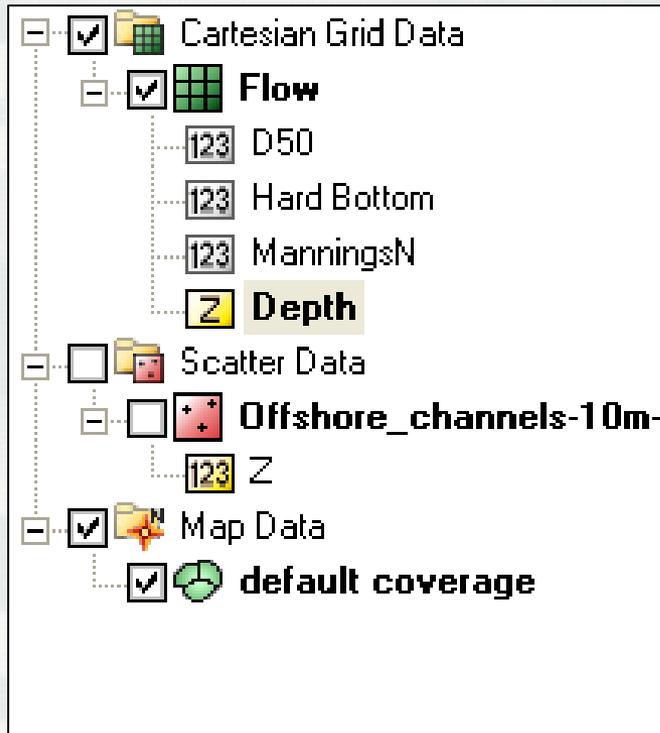
- Select Feature Node 
- Create Feature Node 
- Select Vertex 
- Add Vertex 
- Select Feature Arc 
- Create Feature Arc 
- Select Feature Polygon 
- Create 2-d Grid Frame 
- Select 2-d Grid Frame 

Selection tools usually have an arrow that points to the specific type of element.

Creation tools are identical to selection tools, only they do not have the arrow.



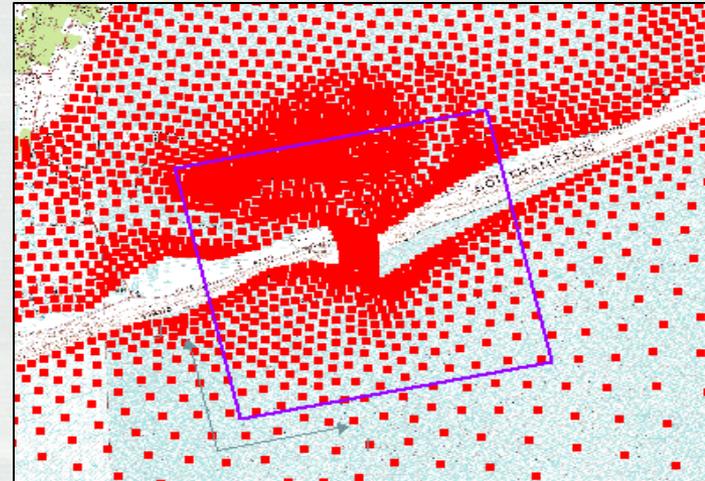
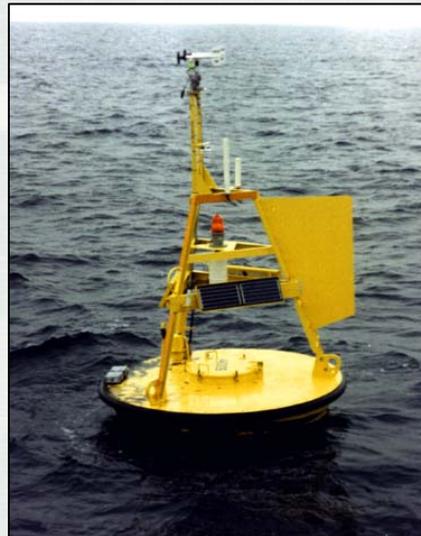
Data Tree Components



- The Data Tree makes selection of loaded datasets easy. Simply click on a dataset to make it active, and the graphics window updates accordingly.
- There are several “right-click” options available depending on the type of dataset activated, and within which module it is located. A few of these are:
 - ▶ Basic Dataset Information
 - ▶ Dataset-specific contour options
 - ▶ Export to file
 - ▶ Metadata Information
- The display of each asset in the Data Tree can be turned off by unchecking the display box next to the dataset name.

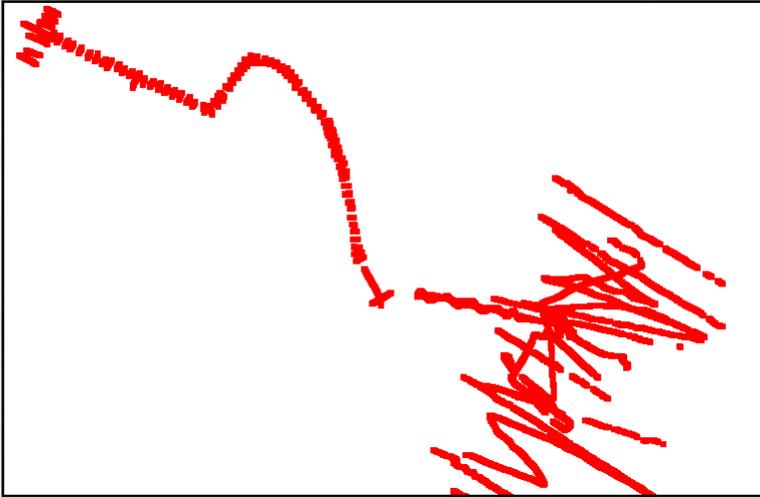


- **Images**
- **Map Module**
 - ▶ Coastlines
 - ▶ Field data
- **Scatter Module**
 - ▶ Scattered depth data





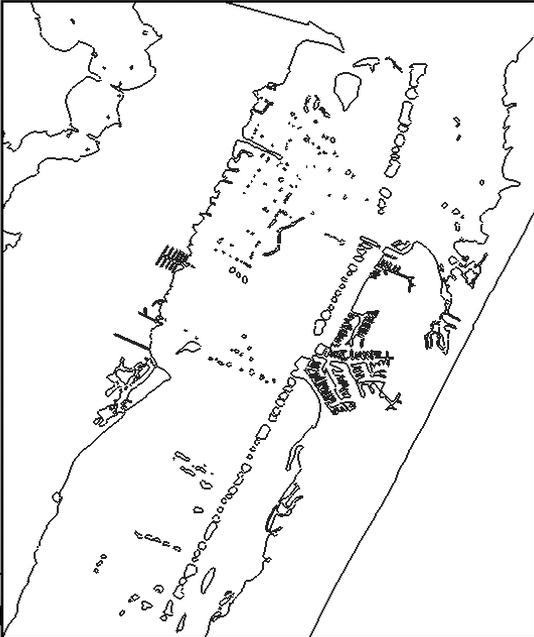
Data Types



Bathymetry



Aerial photographs or other plan-view images



Coastline

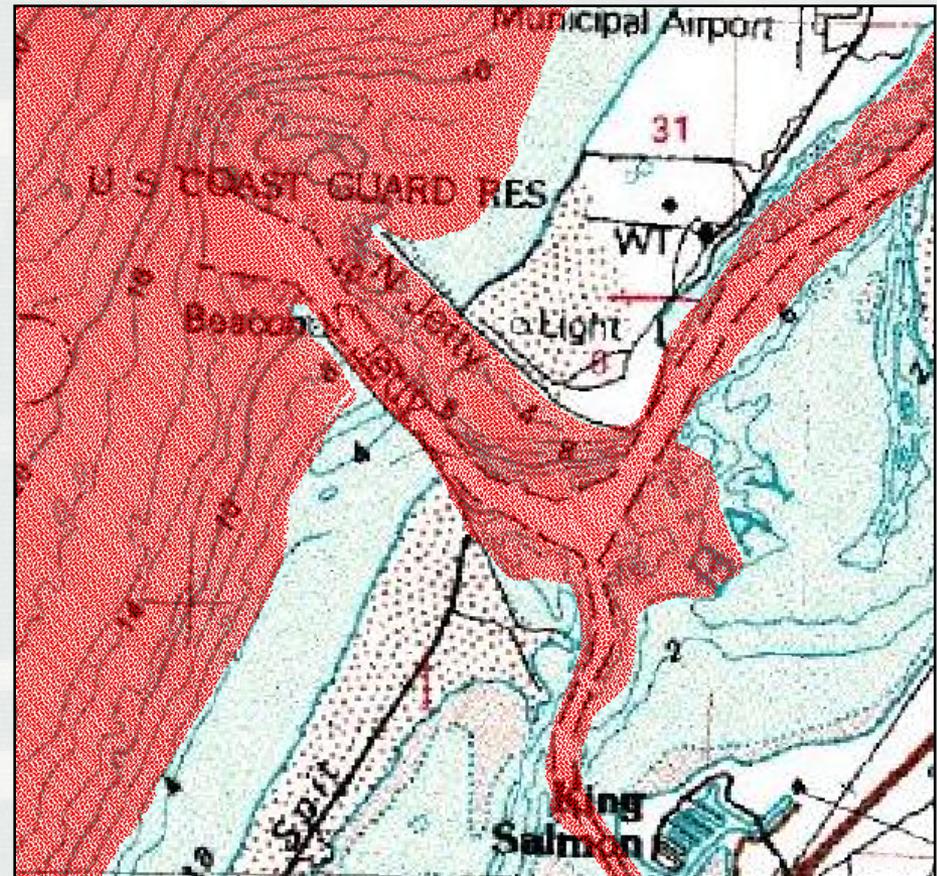


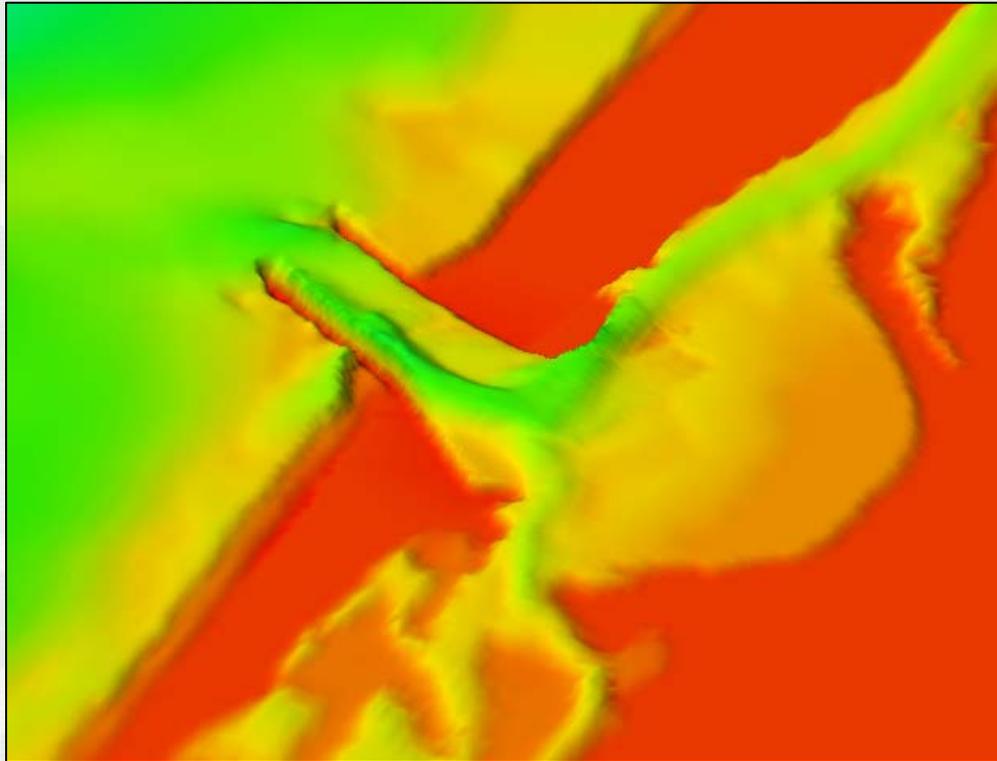
Scatter Data (TINs)



- **Stores spatially varied data**

- ▶ Bathymetric data most common
- ▶ Interpolates from one grid/mesh to another
- ▶ Allows combination of data sources
- ▶ Facilitates data thinning or filtering





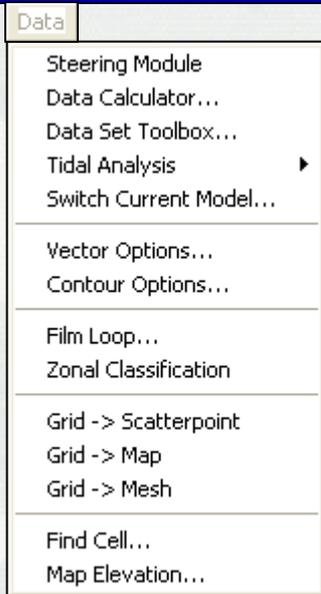
Humboldt Bay, CA
Oblique view
Z-magnification 5x

■ Options

- ▶ Magnify in Z direction
- ▶ Oblique or plan views
- ▶ Fill with contours options
- ▶ Shading



3. CMS-Flow Interface: Pull-down Menus



The Data pull-down menu contains many items – here are a few:

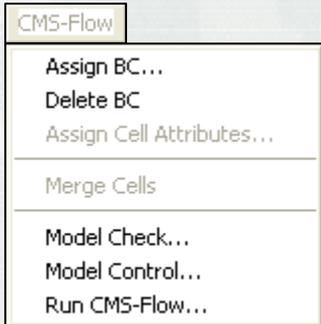
- Steering Module – Starts/controls interaction between Flow and Wave
- Data Calculator – Dataset-based functions
- Dataset Toolbox – Dataset-based operations (includes Calculator)
- Vector/Contour Options – Change appearance of data within the Graphics Window
- Film Loop – Generate animations based on loaded data/solutions
- Grid -> Scatterpoint – Convert CMS-Flow grid to Scatterpoint dataset (TIN)



The Cellstring menu contains operations for boundary condition forcing strings.

The CMS-Flow menu contains commands to operate the model.

- Assign BC – Assigns boundary condition forcing information to cellstrings
- Delete BC – Delete the forcing information from a cellstring
- Model Control – Set up the parameters and running options for the CMS-Flow simulation
- Run CMS-Flow – Start CMS-Flow based on Model Control options.





CMS-Flow Model Control

Parameter Specification and File I/O



- Time Control
- Auxiliary Files
- Parameters
 - ▶ Wet/Dry depth
 - ▶ Flags
- Calculations to Include
 - ▶ Sediment Transport
 - ▶ Wind
 - ▶ Waves
 - ▶ Salinity

CMS-Flow Model Control

Model Parameters | Transport | Tidal | Wind/Wave | Output | Cells | Advanced

Time Control

Start date: 12/01/2007

Start time: 12:00 AM

Simulation duration: 744.0 hrs

Ramp duration: 24.0 hrs

Hydrodynamic time step: 0.5 secs

Hot Start

Initial conditions file

Write Hot Start output file

Time to write out: 0.0 hrs

Automatic recurring Hot Start file

Interval: 0.0 hrs

Parameters

Anemometer height: 10.0 m

Depth to begin drying cells: 0.05 m

Include wall friction

Latitude throughout grid

Cell-specific latitude

Average latitude: 0.00

Momentum Equation

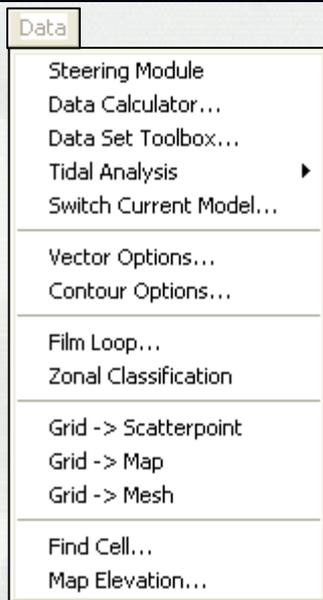
Include advective terms

Include mixing terms

Help OK Cancel



4. CMS-Wave Interface: Pull-down Menus

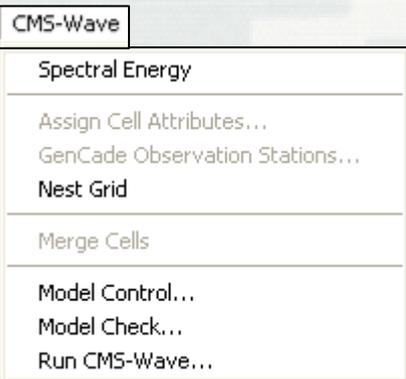


The Data are the same for both CMS-Flow and CMS-Wave.

- Steering Module – Starts/controls interaction between Flow and Wave
- Data Calculator – Dataset-based functions
- Dataset Toolbox – Dataset-based operations (includes Calculator)
- Vector/Contour Options – Change appearance of data in Graphics Window
- Film Loop – Generate animations based on loaded data/solutions
- Grid -> Scatterpoint – Convert CMS-Flow grid to Scatterpoint dataset (TIN)

The CMS-Wave menu contains commands to operate the model.

- Spectral Energy – Allows user to Create Spectral Energy forcing from wave characteristics or Import existing data from a wave gauge
- Nest Grid – Allows use of a nested (child) wave grid for better resolution in some areas
- Model Control – Set up the parameters and running options for a CMS-Wave simulation
- Model Check – Analyze present wave grid and modeling parameters for errors before run commences.
- Run CMS-Wave – Start CMS-Wave based on Model Control options.

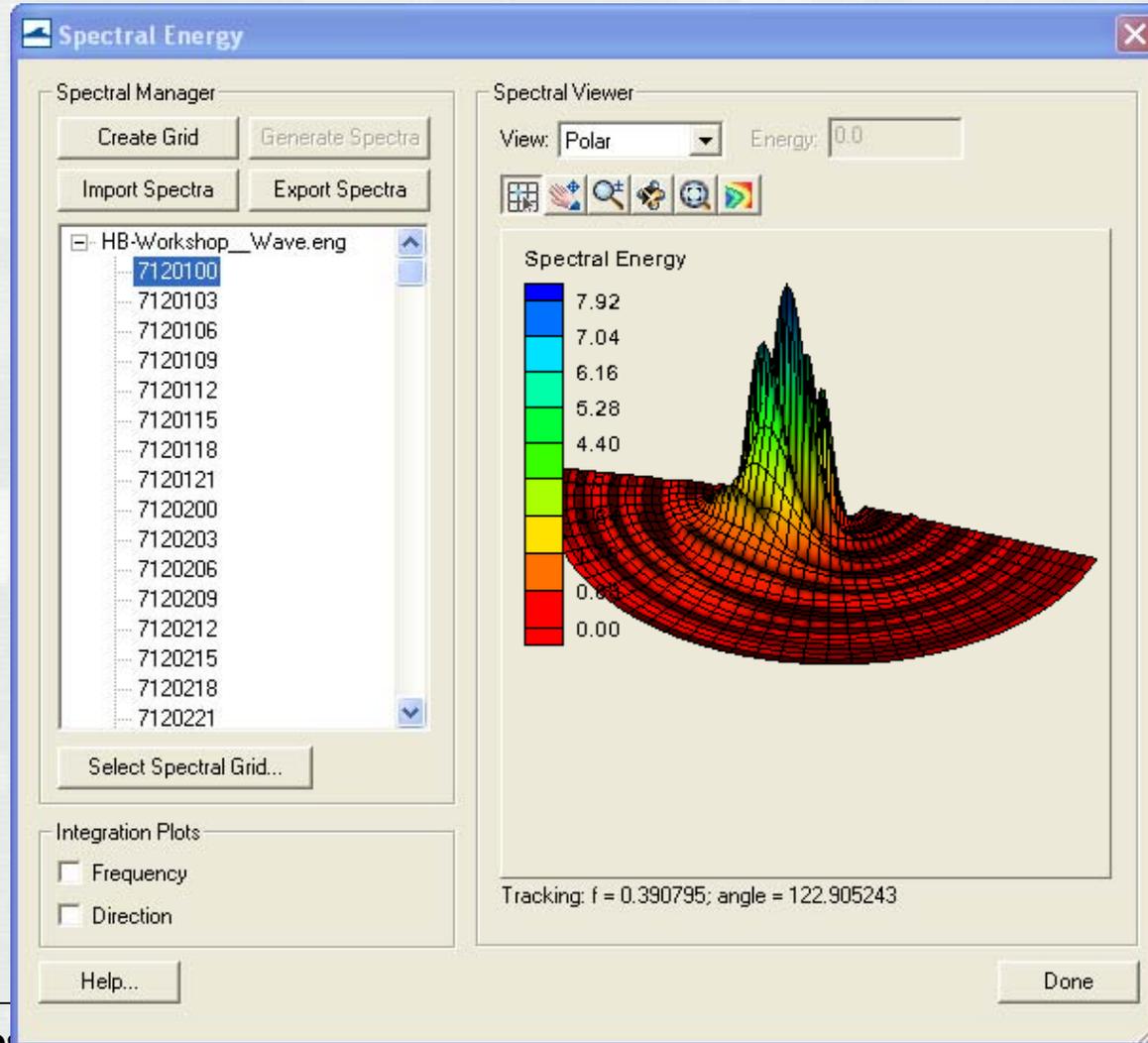




Spectral Energy menu



Example of Imported Spectra from Wave Gauge





Generate Spectra from Bulk Criteria



Generate Spectra

Parameter Settings

Generation Method: TMA (Shallow Water)

Replace Old Spectra

Directional Spreading Distribution:

Wrapped Normal

Cosine Power

Gauge Depth:

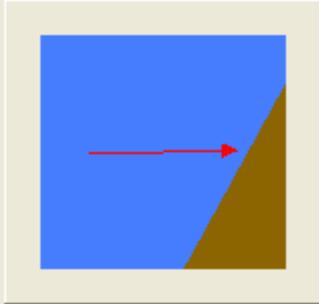
Specify once for all spectra

0.001 m

Specify for each spectrum

Angle Settings

Projection: Shore Normal



Spectral Parameters

	Index	Angle (deg)	Hs (m)	Tp (s)	Gamma	nn
1	1	30.0	2.0	10.0	3.3	4
2						

Import Import from GenCode Export Spectral Defaults >>

Help... Generate Cancel



Model Control



- Turn on Wetting & Drying of Cells
- Turn on Reflection (FWD, BWD)
- Choose Bed Friction type
- Set parameters
- Choose Output Datasets
- Choose Wave Source

CMS-Wave Model Control

Grid Definition

X origin: 1803052.5641 m	Cell size: 163.924735 m
Y origin: 656959.6380 m	Columns: 187
Angle: 331.5357 deg	Rows: 271

Settings

<input checked="" type="checkbox"/> Allow wetting and drying	<input type="checkbox"/> Bed friction	<input checked="" type="checkbox"/> Diffraction intensity: 4.0
<input type="checkbox"/> Forward reflection	<input checked="" type="radio"/> Spatially constant Cf: 0.005	<input type="checkbox"/> Currents
<input checked="" type="radio"/> Spatially constant: 0.5	<input type="radio"/> Spatially varied Cf: Select... none selected	<input checked="" type="radio"/> Single timestep: Select... none selected
<input type="radio"/> Spatially varied: Select... none selected	<input type="radio"/> Spatially constant n: 0.005	<input type="radio"/> All timesteps: Select... none selected
<input type="checkbox"/> Backward reflection	<input checked="" type="radio"/> Spatially varied n: Select... none selected	
<input checked="" type="radio"/> Spatially constant: 0.3		
<input type="radio"/> Spatially varied: Select... none selected		

Cf = Darcy-Weisbach friction coefficient
n = Manning friction coefficient

Wave Source

<input checked="" type="radio"/> Spectra	Parameters...
<input type="radio"/> Wind	
<input type="radio"/> Spectra and wind	
<input type="radio"/> Simplified formulation	

Output

<input type="checkbox"/> Radiation stresses
<input type="checkbox"/> Breaking
Function: Extended Goda
<input checked="" type="radio"/> Indices
<input type="radio"/> Energy dissipation

Help... OK Cancel



5. What's New in SMS 10.1



- Dataset Toolbox
- Grid duplication/rotation tools
- Web Menu
- Spatial Data Coverages
 - ▶ Data types
 - ▶ Plot types
 - ▶ Compass plots
- Coordinate Projections
 - ▶ More projections
 - ▶ Automatic re-projection of data with projection file
- Annotation Layers
 - ▶ North Arrows
 - ▶ Legends
 - ▶ Screen Space Images



Dataset Toolbox



Dataset Toolbox

Tools

- Math
 - Compare data sets**
 - Data Calculator
- Temporal
 - Sample time steps
 - Compute derivative
- Conversion
 - Scalar to Vector
 - Vector to Scalar
- Modification
 - Map activity
 - Filter

Compare data sets

Base

- pensafLOW 1990 (CMS-Flow)
 - D50
 - Hard Bottom
 - ManningsN
 - Depth
 - Simulation
 - pensafLOW 1990_elev
 - pensafLOW 1990_morph

Alternate

- pensafLOW 1990 (CMS-Flow)
 - D50
 - Hard Bottom
 - ManningsN
 - Depth
 - Simulation
 - pensafLOW 1990_elev
 - pensafLOW 1990_morph

Data Set Info...

Value if base is inactive: -99.0

Value if alternate is inactive: 99.0

Output data set name: new data set

Update Available Tools

Help...

Compute

Done



Dataset Toolbox

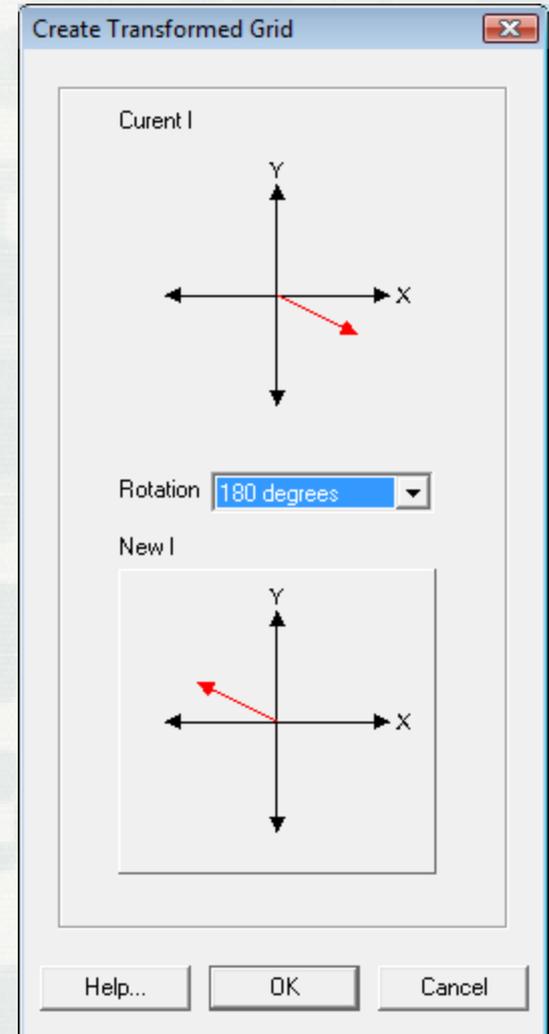


- Temporal Operations
 - ▶ Sample times
 - ▶ Temporal derivatives
- Mathematical Operations
 - ▶ Comparisons
 - ▶ Data Calculator
- Spatial Operations
 - ▶ Spacing
 - ▶ Gradients/Derivatives
 - ▶ Smoothing
- Conversions
 - ▶ Vector <-> Scalars
- Coastal Functions
 - ▶ Wavelength/Celerity
 - ▶ Courant number
- Activity Mapping
 - ▶ Map activity
 - ▶ Value filtering



Duplicate/Rotate Grid

- Accessed by Right Click on Grid in Project Explorer
 - ▶ Duplicate Flow grid for Wave model or vice-versa
 - ▶ Rotate Wave grid to appropriate orientation





- **Import data from web ...**

- ▶ Virtual Earth
- ▶ Image data
- ▶ Elevation data

- **Find Data**

- ▶ Links to useful web sites

- **Tidal Data**

- ▶ Links to coastal filtering tools

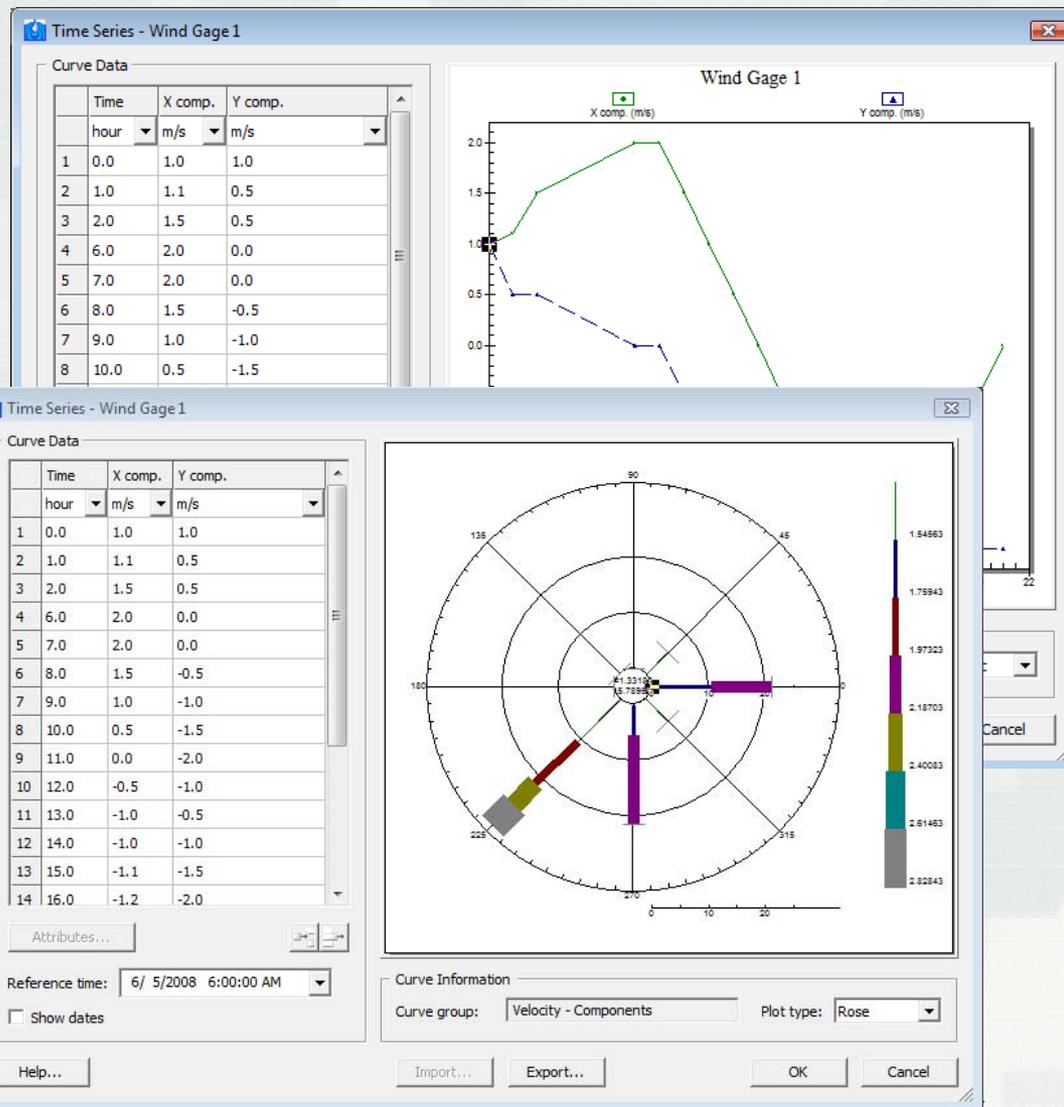




Spatial Data Coverages



- Create nodes at locations of interest (gauges)
- Associate temporal data with location
 - Scalar data
 - X/Y vector data
 - Mag/dir vector data
- Plot types
 - Scientific
 - Multi-axis
 - Rose plots





Spatial Data Coverages



Compass plot

- Displayed on graphics window
- Updates with dates
- User managed



Compass Plot Properties

Name: Wind (10m)
 Display with compass

Spatial Data

Data	Show	Color
Wind Gage 1	<input checked="" type="checkbox"/>	Red

Legend Display Options

Show legend
Location: Right
 Show min and max values
 Show one vector for each compass ring
Precision: 2

Rings

Number of rings: 3

	Percent of maximum (0 - 100)
1	33
2	66
3	100

Display Options

Compass size: 60
 Only show direction
 Show connection lines
 Filled background
Background color: [Color Picker]
 Specify min/max values for rings
Min: 0.0
Max: 1.0
Arrow style: Normal

Buttons: Help..., OK, Cancel



Coordinate Projections



- All major datums
- Project
 - ▶ Point
 - ▶ Object
 - ▶ Entire project
- Support for projection files
- Automatic detection of projections
 - ▶ Images
 - ▶ CAD
 - ▶ GIS

Reproject Current

Current projection

Specify

Horizontal

Local projection

Units: []

Global projection

[Set Projection]

Current projection: State Plane Coordinate System

Vertical

Projection: [Local]

Units: [Meters]

New projection

Horizontal

Local projection

Units: []

Global projection

[Set Projection]

Select Projection

Projection

Projection: [State Plane Coordinate System] [Load From File...]

[Save To File...]

Datum: [NAD83]

Planar Units: [METERS]

Zone: [Florida West (FIPS 902)]

Parameters:

Attribute	Value
STATE PLANE SCALE FACTOR	1.000000000

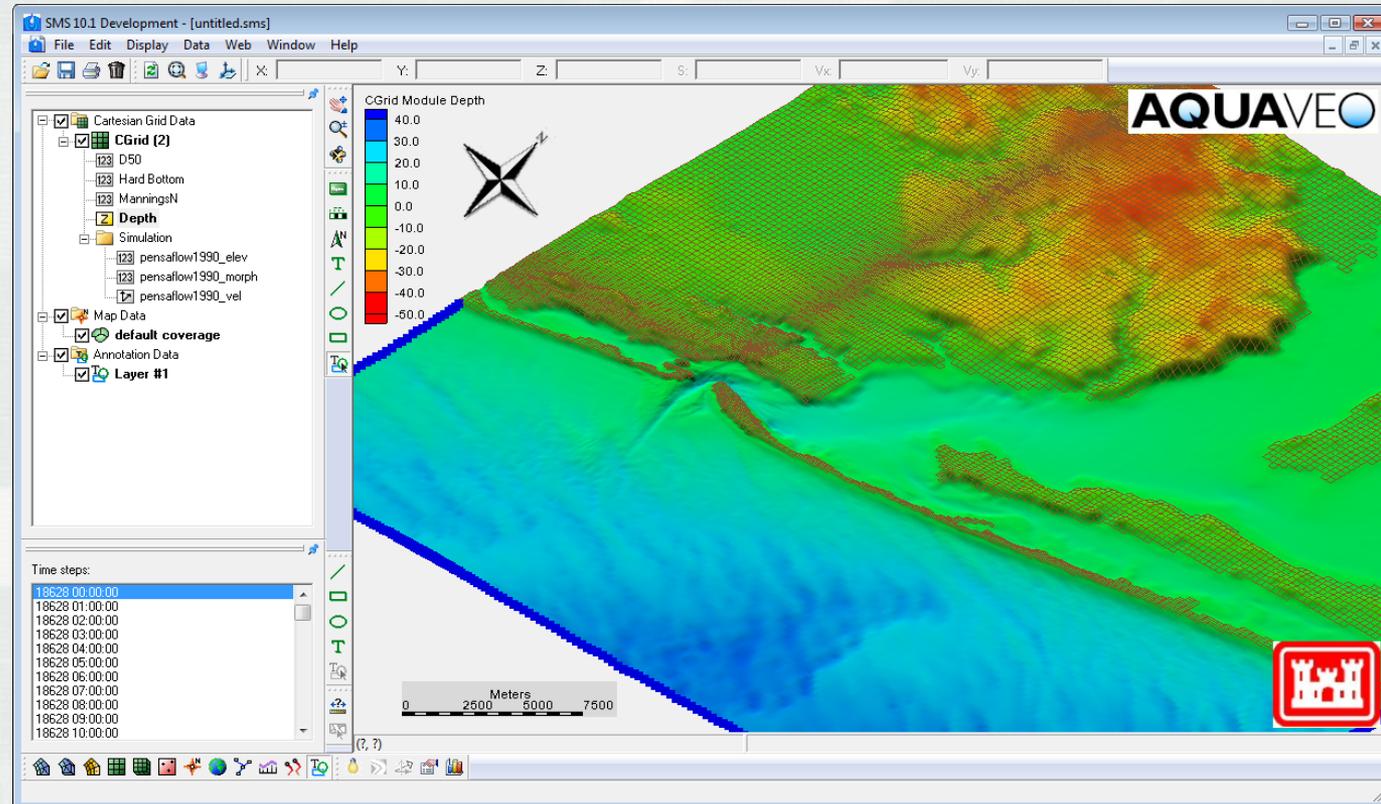
[OK] [Cancel]



Annotation Layers



- Replaces Drawing Objects
- New Objects
 - ▶ Screen space images
 - ▶ Scale bars
 - ▶ North Arrows
- Organizes entities into layers
- Anchored in either world or screen





6. New CIRP Info-Products: CIRP Wiki



CIRP Wiki site for:

- Program Information
- Updatable (Living) Documents
- Product Tutorials
- SMS Help for CMS-Flow and CMS-Wave Interface screens
- Links to other useful sites

<http://cirp.usace.army.mil/wiki>

Welcome to the CIRP Wiki Information on CIRP and online help for all CIRP/CMS products.

About the Wiki

The CIRP Wiki is an online help database for CIRP information/publications and CMS modeling software. This wiki is meant to be a main resource for CMS users. For any Wiki issues, please contact [Mitchell Brown](#).

Note that the CIRP Wiki does not follow exactly the same concepts as the Wikipedia. An important difference is that it is not possible to edit anonymously. All contributors have an identity, allowing discussion to take place between those submitting articles on similar subjects. This also promotes informed debate, should differences occur in the interpretation of information. Additionally, some pages are only editable by CIRP team members and not the general public.

Coastal Modeling System (CMS) Related Pages

- [CMS Overview](#)
- [CMS-Flow Model](#)
- [CMS-Wave Model](#)
- [CMS Publications](#)

Other Links

- [CIRP Products](#)
- [CIRP Website](#)
- [CIRP Event Horizon](#)
- [Aquaveo](#)
- [Surface-water Modeling System \(SMS\) Wiki](#)

About the Coastal Inlets Research Program

The Coastal Inlets Research Program, or CIRP, advances the state of knowledge and develops engineering technology for predicting the waves, current, sediment transport, and morphology change at and around inlets. Products of the CIRP improve management and design of coastal inlets through increased reliability of actions and reduction in operation and maintenance costs. The CIRP takes a variety of approaches, including developing concepts and theory for all relevant time scales, numerical simulation, field data collection, and laboratory experimentation. Reports and peer-reviewed articles as found on this web site provide the information gained from the CIRP to the Corps, scientific community, and public.

HQ USACE Oversight Navigation Business Line Manager James E. Walker	Technical Director for the Navigation Systems Program Jeff Lillycrop, CHL
CIRP Program Manager Dr. Julie Dean Rosati, CHL - Julie.D.Rosati@usace.army.mil	CIRP Assistant Program Manager Dr. Nicholas C. Kraus, CHL - Nicholas.C.Kraus@usace.army.mil



Coastal-Modeling-System Discussion List (LISTSERV)



CMS Discussion List provides two-way interaction:

- Announcements
 - ▶ Workshops
 - ▶ CMS Publications
- Updated Releases
 - ▶ New Features
 - ▶ Bug Fixes
- CMS Questions from users
 - ▶ How do I ...?
 - ▶ I'm having trouble with ... !

LISTSERV 15.5
Subscriber's Corner Email Lists Log In

LISTSERV Archives

LISTS.COASTAL-INLETS-RESEARCH-PROGRAM.NET

Options: [Log In](#) | [Get Password](#)

Resources: [About LISERV](#)
[LISTSERV Documentation](#)
[Catalist Email List Search](#)

List Name	List Title
Coastal-Modeling-System	a discussion list for the CMS (44 Subscribers)

Access Unlisted Archives:

LISTS.COASTAL-INLETS-RESEARCH-PROGRAM.NET

Searchable Web archive of previous posts, separated by topic (Features, Models, Workshops, Other) and sorted by date.



SMS and CMS improve with your Feedback!



- Opportunities for feedback throughout workshop
- Let us know what works, what could be better, and what would improve future releases
 - ▶ Visualization...calculations...upward reporting and sharing of knowledge...additional capabilities...and more!

