

SMS 11.2

Surface Water Modeling System

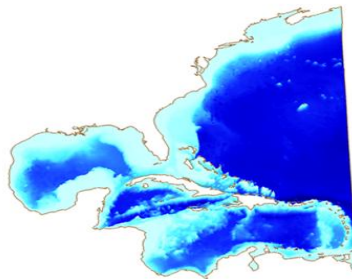
The Complete Modeling Solution

SMS offers the complete solution for efficiently managing the entire surface-water modeling process



➤ Flexible modeling approaches

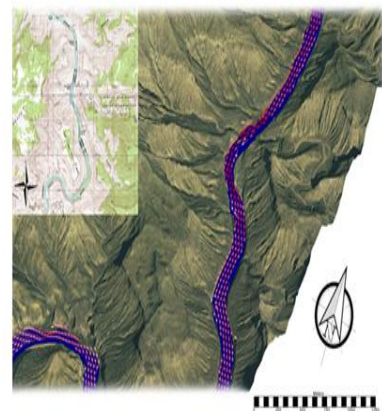
Aquaveo pioneered the conceptual model approach. Build a conceptual model in SMS by constructing a high level representation of the model using familiar GIS objects: points, arcs and polygons. Work with large, complex models in a simple and efficient manner by using the conceptual modeling approach and easily update or change the model as needed. SMS also has powerful tools to build meshes and grids.



➤ 3D visualization optimized for performance

SMS is the most advanced software system available for performing surface-water simulations in a three-dimensional environment.

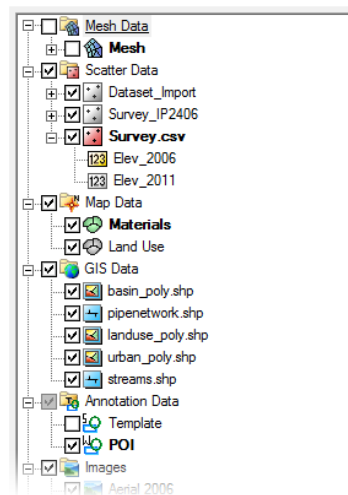
- Interact with models in true 3D
- Optimized OpenGL graphics for improved hardware rendering
- Create photo-realistic renderings
- Generate animations for PowerPoint or web presentations
- Drape images over the model and control the opacity
- Annotations – Add north arrows, scale bars, reference images, company logos, and more



➤ Import what you need

Models require data from many different sources. That's why SMS is built to easily import numerous file types:

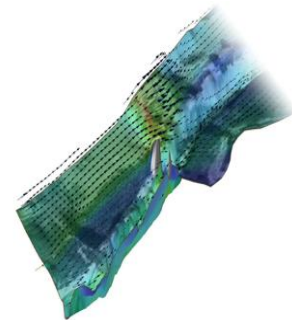
- Raster images including georeference and projection support
- Topographical maps & aerial photos
- Elevation & bathymetry data
- Web data services such as TerraServer
- ArcGIS geodatabases and shapefiles
- CAD files including .dwg, .dgn, and .dxf formats
- Worldwide projection support including Cartesian and Geographic Systems
- File Import wizard for delimited text files and spreadsheets



➤ Advanced riverine & coastal modeling

SMS interfaces with a wide range of numerical models for applications including:

- Riverine analysis
- Contaminate transport
- Sediment transport
- Particle tracking
- Rural & urban flooding
- Estuarine
- Coastal circulation
- Inlet & wave modelling



➤ Software from an Industry Leader

SMS is developed by Aquaveo, an engineering services company with many years of experience developing groundwater modeling solutions.

- Step-by-step tutorials and how-to videos
- Online community forum and product documentation
- Phone and email technical support
- Regularly scheduled training courses taught by expert modelers
- On-site training available
- Professional consulting services

➤ SMS 11.2 System Requirements

- **Operating System:** Windows XP*, Vista®, Windows 7 or Windows 8
*Limited support for Windows XP with some limitations using certain fonts and display options.
- **RAM:** 1 GB (8GB or more recommended)
- **CPU:** SMS software is CPU intensive. Some models and utilities integrated with SMS can take advantage of multiple processor cores simultaneously.
- **Graphics Card:** For all display features to be enabled, OpenGL 1.5 or higher must be supported. The use of a dedicated graphics card is strongly recommended. Integrated graphics can result in significantly reduced performance and may not support some visualization features.
- **Display Resolution:** 1024 x 768 or greater
- **CPU:** SMS software is CPU intensive. We recommend the fastest CPU your budget allows. A multi-core CPU may be useful for multi-tasking while SMS is running. However, SMS software does not use more than a single core at this time, so a faster dual core may provide better performance than a slower quad core CPU.
- **Graphics Card:** For all display features to be enabled, OpenGL 1.5 must be supported. We recommend NVIDIA® Quadro® based graphics cards because of their superb OpenGL support. The use of a dedicated graphics card is strongly recommended. Integrated graphics cards are often problematic.
- **Display Resolution:** 1024 x 768 or greater



What's new in SMS 11.2

General Features

- **Dataset Toolbox**
- A Merge Datasets option is now available in the Dataset Toolbox
- **Interface Components**
- Projection commands have been moved to the Display menu
- A Reproject All command has been added in the Display menu
- Help buttons in dialogues will open the corresponding page in the XMSWiki
- **Dynamic Model Interface** - We are excited to present a more flexible and powerful alternative to the generic model interface that has been supported by SMS for several years. This methodology allows a model developer to define all the attributes of an interface for a specific model in an XML file. SMS will read this file when launched, and then interact with the model. This schema is defined in Dynamic Model Interface Schema. The dynamic model interface includes:
 - Model specific menu commands
 - Model specific parameters
 - Model specific boundary conditions
 - Model specific file formats (for both reading and writing)
 - Model specific execution procedures including as many different pre-run utilities or execution steps as are required by the model
- **MIKE 21 (*.mesh) File Support** - MIKE 21 (*.mesh) files can now be loaded into SMS. See the article MIKE 21 *.mesh
- **LIDAR File Support** - SMS can now recognize a LIDAR file when a user asks the system to read such a file. The user can choose the import methodology to load selected

layers from the file as either a scatter set or a raster. SMS also loads an image of the data in the specified format.

- **Saving Color Palettes** - Color palettes will now be saved when doing File | Save Settings. When SMS is loaded, any saved palettes will automatically be loaded as defaults.
- **NOAA HURDAT File Support** - SMS will now load storms for the standard NOAA HURDAT format. The file will need to have a *.hurdat2 extension to be recognized by SMS.
- **Contour Options** - The default values for contour options in a dataset will be that of the module
- **Vector Display Options**
- New display option feature for showing vector arrows at a constant elevation. See Vector Display Options for more information.
- - New display option for vector arrows to follow flow path (vectors curve). This is done by selecting "Arrows follow flow path" under the Vectors tab in the Display Options dialog. Warning: this can be slow if displaying lots of vectors
- **Spectral Coverage** - Spectral coverages are now used to store all spectral data by location and time. These coverages are then used as spectral input for CMS-Wave and STWAVE, and are also used to view spectral output generated by the models in observation and nesting files.

Module Features

- **Curvilinear Grid**
- New tool to split and merge row/column of a curvilinear grid. See the Curvilinear Grid Tools section for more information.
- Ability to merge two curvilinear grids. See the article Curvilinear Grid Module for more information
- **Mesh Module** - SMS 11.2 allows for use of multiple meshes

Model Features

- **SRH-2D** - There is now a custom interface for the SRH-2D model developed by the United States Bureau of Reclamation. This model is a finite volume engine that is very stable in wetting/drying conditions. It has been tested extensively by various agencies, academic and commercial users.
- **ADCIRC**
- There is now support for time varying bathymetry in ADCIRC
- You can now do a spatially average interpolate from a raster/DEM to an ADCIRC mesh
- **ADH** - The CSTORM-MS coupler has been updated to now include AdH meshes in addition to ADCIRC. This is in preparation for linking to AdH simulations for sediment transport in the CSTORM-MS.
- **CMS Flow**
- The cards, values and comments are now displayed in color in the CMS-Flow Advanced tab
- Added projection cards
- **CMS Wave** - All input spectra is now handled in a spectral coverage. This allows the user to utilize multiple observed spectra to drive the model in the same manner that a nested simulation has been used in the past. The timestamps assigned to the spectral data are matched up (or interpolated to match) with the times specified for each case. In order to correctly assign spectral data for each case, SMS now requires CMS-Wave simulations to have a reference time.

- **STWAVE** - The model control now uses a spectral coverage to specify the cases/wave states that will be included in a simulation. This allows a user to utilize multiple observed spectra to drive the model in the same manner that a nested simulation has been used in the past. The timestamps assigned to the spectral data are matched up (or interpolated to match) with the times specified for each case. In order to correctly assign spectral data for each case, SMS now requires STWAVE simulations to have a reference time.

The following is a list of the more significant changes in SMS 11.0

- **New Raster Module**
 - Work with raster (DEM) data in SMS without converting to a scatterset (TIN)
 - Raster data require less memory and draw faster than TIN data
 - Interpolate raster elevations to a scatterset, mesh, or grid
- **ADH Model Interface**
 - SMS seamlessly interfaces with the 2D shallow water component of the US Army Corps Adaptive Hydraulics Modeling system (ADH)
 - Key features of the ADH model include wetting/drying of elements, boat effects, wind effects, and an adaptive mesh, where element resolution is dynamically adjusted as needed
 - The ADH interface in SMS was developed in collaboration with the Coastal and Hydraulics Laboratory at the USACE Engineer Research and Development Center
- **WAM Model Interface**
 - WAM is third generation wave model that predicts directional spectra as well as wave properties such as significant wave height, mean wave direction and frequency, swell wave height and mean direction, and wind stress fields corrected by including the wave induced stress and the drag coefficient at each grid point at chosen output times.
 - Build WAM grids, create simulations, nest grids, view solutions, and generate spectra for STWAVE model input
- **Bouss2D Run-up & Overtopping**
 - Run Bouss2D in 1D mode to simulate run-up and overtopping of waves
 - Extract transects, position gages, specify roughness zones, and define multiple wave cases
 - Create 2D profile plots along transects, time-series plots of gage output, and generate summary statistics such as height of peak waves within a percentile range and the point of furthest encroachment on each transect
- **TUFLOW Advection-Diffusion Module**
 - The new TUFLOW AD Module is fully supported by SMS
 - TUFLOW AD simulates depth-averaged, two and one-dimensional constituent fate and transport
 - Simulate both dissolved and particulate constituents
 - Create spatially varied initial concentrations and transport coefficients
- **Generic Model Interface Enhancements**
 - Boundary condition and material property templates have been expanded to include more data types
 - Assign multiple boundary conditions to a single node, element, or nodestring
 - Create templates that show/hide parameters based on a selected option
 - Define multiple material groups
- **CMS Model Updates**

- Couple of flow and wave models without the steering module using the CMS inlined version
- Implicit solution scheme in CMS Flow allows for larger time steps and parallel computing across multiple processor codes..
- CMS wave new features include muddy bed definition, non-linear wave effects, infragravity wave effects, spatially varied wind field, XMDF output, and a Gauss-seidel solution scheme which utilizes multiple processor cores
- **TUFLOW Model Updates**
 - Import TUFLOW projects created outside of SMS
 - Output datasets to XMDF
 - Create and manage irregular culverts
 - New manhole features
- **STWAVE Model Updates**
 - Support for the new STWAVE v6.
 - Extract boundary conditions from a WAM model
 - Improved iteration control for the full-plane version
- **Particle Module Updates**
 - Estimation guidance for the number of particles that will be generated by a PTM source coverage
 - Create virtual gages to compute concentrations and other data around a point or within a polygon
 - Use particle filters to display a subset of particles to use for display, selection and compute grid datasets
- **ArcGIS Map Server Layers**
 - With a license to ArcGIS and an internet connection, utilize ESRI's database of maps and open ArcGIS map server layers in SMS
 - Background maps are updated on-the-fly as the display is zoomed and panned
- **Other New Features**
 - Assign native projections to cartesian grids and project grids on-the-fly to the working projection.
 - SMS now saves a world file and projection file if appropriate when saving the graphics window as an image file
 - Export mesh elements to a shapefile using the Mesh->Map command
 - Import TINs from LandXML files
 - Use the "Zoom to..." feature to easily zoom to the extents of a mesh, grid, scatterset or bounds of selected objects