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quick facts on…
Regional Simulation Model (RSM)

Simulating South Florida's Water Needs for Today and Tomorrow

JUNE 2006

The South Florida Water Management District *is a regional, governmental agency that oversees the water resources in the southern half of the state. It is the oldest and largest of the state's five water management districts.*

Our Mission is to manage and protect water resources of the region by balancing and improving water quality, flood control, natural systems, and water supply.

The RSM is a fully coupled finite-volume surface water/groundwater model that implicitly solves for water stages (heads) and flows under natural conditions as well as under conditions managed using structures, canal networks, and levees. The RSM has two principal components, the Hydrologic Simulation Engine (HSE) and the Management Simulation Engine (MSE). The HSE simulates natural hydrology, water control features, water conveyance systems and water storage facilities. The HSE component solves the governing equations of water flow through both the natural hydrologic system and the man-made structures. The MSE component provides operational and management capabilities to the HSE. The MSE is capable of simulating a wide range of management operations through water control features. Emphasis in the development of the RSM has been on:
• Computational efficiency,
• Allowing application of modern automated calibration methods, and
• Multi-decadal simulation capacity.
This design facilitates testing and evaluation of water resource project alternatives and system operations at a regional scale.
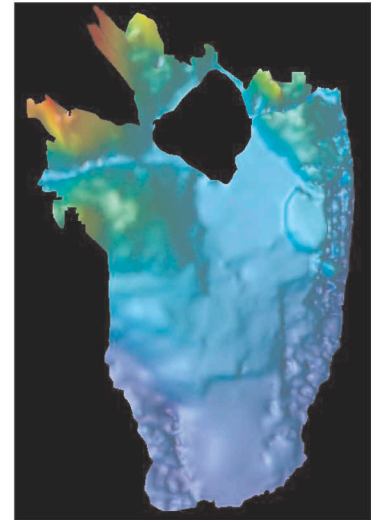

The Regional Simulation Model (RSM) *will provide a next-generation regional modeling tool that can simulate the extreme hydrologic complexities of South Florida today and for years into the future. The model is expected to:*

- *provide a **modular**, **easily modified**, more scientifically defensible model than the South Florida Water Management Model, the current best available tool*

- *be the **next generation regional hydrologic simulation tool** for South Florida, incorporating new technology and data*

- *provide an **easy learning curve to conduct regional modeling** and create a broader base of individuals and consultants who can apply the model*

- *provide the basis on which **future system-wide modeling of management alternatives** can be built*

Power Features:

• Modular construction of complex water conveyance systems operations

• Use of automated calibration and sensitivity analysis tools

• Standardized input through use of XML

Simulation Capabilities:

RSM is uniquely designed to address planning needs of South Florida water resource managers. It is intended for application to answer long-term planning needs for key projects such as CSOP/ISOP, Acceler8, CERP, and RECOVER. RSM can:

• quantify changes in groundwater levels, wetland hydroperiods, groundwater and overland flow, groundwater recharge to wellfields, permitted vs. actual pumpage, effects of wellfield relocation, alternatives on urban and agricultural flood potential,

• provide estimates of pre-development response to climatic input data, help determine or set restoration targets (NSRSM)

• quantify levee seepage management, effects of limited operational modifications, and project assurances

• quantify alternative structure and reservoir operations, management of current features and future planned features (SFRSM)

• quantify project benefits including effects of different local operations, wastewater reuse benefits, and aquifer storage and recovery (ASR)
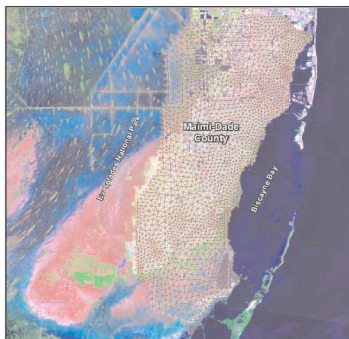
sfwmd.gov

Sample RSM Applications

Early RSM applications were used to improve model concepts, features and robustness. The model is in a continuous state of development and improvement. Some early applications include:

• Everglades National Park
• Loxahatchee Watershed
• Southern Everglades
• Southern Miami-Dade County
• NSRSM


Mesh for Miami-Dade v1.0

Upcoming Enhancements

• Management capabilities are being developed to allow greater flexibility and to handle the operational complexity in south Florida.

• A new water quality process module is under development, which will allow consideration of water quality issues along with hydrologic considerations in regional water management operation scenarios.

• Research into providing HDF5 file format support is underway to enhance performance of the model when using large datasets (e.g., 36 years of daily data over 27,000 mesh cells).

• The RSM Document Set is under revision, with new versions of key documents being issued in 2006 and 2007.

Model Display

A graphical user interface has been created to help organize and provide easy access to a collection of intuitive tools to assemble model scenarios, run the model and analyze model results. Key features in the GUI help users:

• Pre-process GIS data
• Generate XML files used to build a scenario
• Modify the calibration XML used to run the model
• Execute an RSM model run
• Post-process model output
• Generate graphics to help analyze and compare scenarios
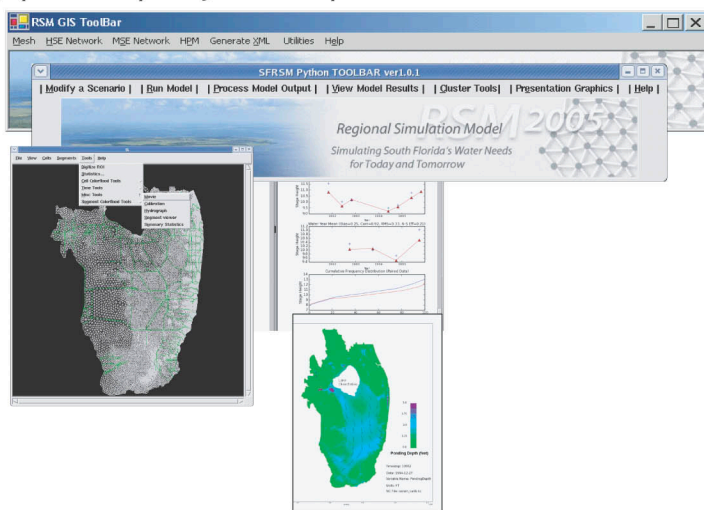

Hardware/Software Platform

• RSM runs under Linux OS on PC or UNIX hardware

• Developed in C++, with Python scripting for pre- and post-processing

• XML input, plus optional I/O formats including HEC/DSS, NetCDF

• GMS interface for enhanced mesh development

Model Available Now

Visit the RSM website at:
www.sfwmd.gov/site/index.php?id=342 to find the latest information on new model developments and for access to the model code and documentation.

Support is available for internal SFWMD customers through the Hydrologic & Environmental Systems Modeling Department, Ken Tarboton, Project Manager *(ktarbot@sfwmd.gov)*. The SFWMD internal RSM website at:

http://iweb/iwebB501/omod/reg_mod/ rsm_docplan/rsm_docplan.html contains draft documents and interim deliverables that have not yet been approved for release outside the agency.
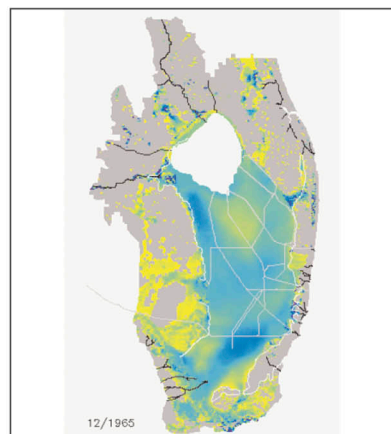
RSM data can be animated for ponding depths and flow vectors.