OASIS Software

Since 1985, HydroLogics has used advanced optimization and simulation techniques to improve long-term planning and short-term operations. OASIS allows us to help our clients find better, more workable solutions in a timely and cost-effective way.

OASIS is the foundation of our consulting practice. It has application in River Basin Management, Water Supply, Hydropower, and Conflict Resolution. The software makes it easy to analyze operating rules that can yield large savings for managers faced with system expansion decisions or operating compliance. Rules can be developed with a planning model and then operators can use the very same software as a decision-support model to ensure that the rules are properly implemented. OASIS can be customized to suit clients' needs and is supported with training and free upgrades.

OCL: The Key to OASIS

OCL, short for Operations Control Language, is HydroLogics' patented language for describing water system operating rules. OCL allows you to enter operating rules that are as simple or complex as the real-world rules that govern the system you are modeling.

OASIS Provides Enormous Flexibility

We have designed OASIS to be extremely flexible whether you are building a new model or modifying an existing one. You won't have to deal with complicated source code changes as with other models. OASIS will save you time and money.

Input data can be entered in many forms:
- Constants
- Time-series values
- Time patterns (values that cycle every year)
- OCL (rule-based input)

With OASIS you have the option of using pre-specified rule forms AND the freedom to write new rules. You can modify the form of the rule as well as the parameter values.

OASIS Mimics Operators' Intuition

A linear program solver is the engine hidden inside of OASIS. Because OASIS uses linear programming to simulate routing decisions, all operating rules are represented as either goals or constraints. A constraint is a rule that OASIS must obey, while a goal is a rule that OASIS tries to meet. Goals may be in competition with each other, and a system might not be able to satisfy some or all of the goals. Modeling operating rules as goals is important because goal-seeking behavior is an efficient modeling approach which also corresponds to the way real-world operators and planners work.

For example, reservoir storage targets, instream flow requirements, and offstream deliveries are some typical competing goals. You rank these goals in OASIS input, and then the linear program solver determines how much of each goal is satisfied in each simulation time step (while adhering to any constraints). Other software requires these competing goals to be modeled with a complex set of "if-then" type rules. The OASIS approach greatly simplifies the task by cutting down on the need for "if-then" rules, while still allowing you the freedom to use them where they are appropriate.

The rules you write in OCL look like the rules that planners, operators, and policy makers use. For example, an agreement between water users might require that the diversion at point A, plus the diversion at point B, must be less than 70% of the flow at point C. In OCL, you would write the following constraint, which is readily recognizable as the mathematical form of that rule:

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CONSTRAINT:
  { dDivertA + dDivertB < 0.70 * dFlowC }
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"With OASIS, we have been able to demonstrate with a high degree of confidence the impact of different operating policies on everyone's objectives. We have the ability to test the assumptions and try alternative methods right at the table, and there's nothing 'black box' about it."

Roanoke River Project Director
The Nature Conservancy, Virginia

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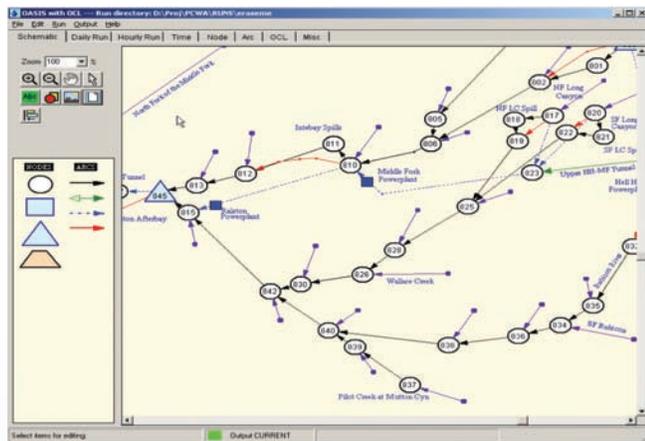
The OASIS Advantage

OASIS is the most powerful and flexible software available for modeling the operations of water resources systems. OASIS is the centerpiece of our consulting practice.

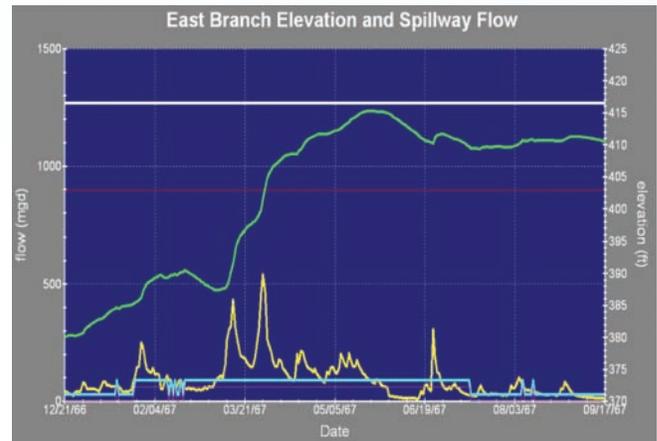## OASIS Runs In Parallel with Other Models

OASIS is able to send and receive data to and from other programs while the programs are running. OCL views other programs as "external modules." External modules can be created from scratch, or existing programs can be fitted to communicate with OASIS. Some tasks suitable for external modules are: groundwater flow, water quality, contaminant transport, habitat availability, rainfall-runoff, and agricultural return flow. This approach allows different specialists to develop and maintain each module. Without OASIS, different models would have to run in series, often requiring an awkward iterative process. With minimal programming, OCL can even be used to control operations in external modules.

OASIS Brings Transparency to Modeling

OASIS input and output is stored in standard database formats. Static data are kept in Microsoft Access and time series data are kept in HEC-DSS databases. These databases provide OASIS with an efficient way of storing and referencing the data. Because all OASIS results are stored in a database, there are no secrets about how the system is represented.

East Branch Elevation and Spillway Flow

The OASIS post-processors quickly present processed output after the model is finished running. Text tables or x-y plots can be created in infinitely configurable ways.

OASIS Includes a Graphic User Interface

The OASIS graphic user interface (GUI) allows you to view and change your system description by editing symbols on an intuitive, interactive schematic. Other forms of input are accessed though user-friendly controls. Changing input, running the model, and viewing output are all done through a common interface. HydroLogics can customize the GUI to reflect the specific needs of your application.

OASIS Reports Performance Measures

The ultimate purpose of a model is to judge the performance of the system. Frequently, stakeholders have diverse ways of measuring that performance. Therefore, OASIS includes powerful post-processor programs that select, process, and display results in the form you need. The GUI allows you to select any number of performance measures to be instantly generated after a model run is complete.

The OASIS GUI allows you to build and work with the model by clicking on the schematic, which shows how each part of the system connects to the whole.

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