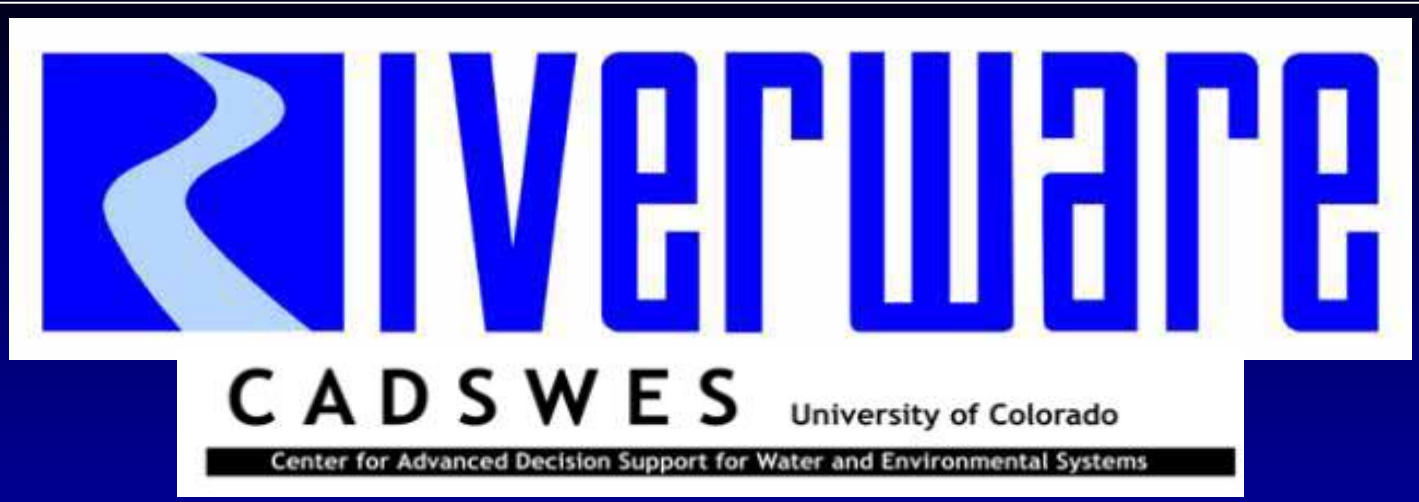


Multiple Run Management

RiverWare User's Group Meeting
February 6 - 7, 2007

Bill Oakley, Jim Prairie, James VanShaar

MRM Modes

- Two main modes – Concurrent and Iterative
- Concurrent mode is frequently used for policy studies
  - The inputs are known in advance
  - The number of simulations is known in advance
- Iterative mode is used for iterative solutions
  - The number of simulations is not known in advance – it's determined by the state of the system after each simulation
- Output is RiverWare Data Format (RDF) file

Concurrent MRM

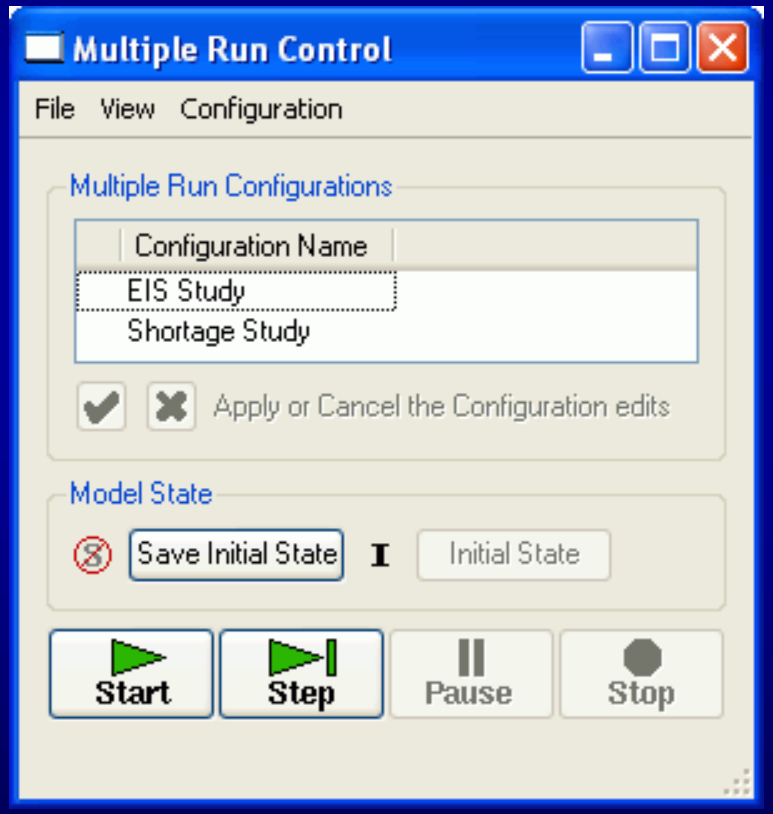
- All simulations have the same start and finish dates
- Define multiple simulation runs by specifying multiple inputs
- Inputs include rulesets, input DMIs and index sequential (rotating time series data)
- RiverWare runs the resulting simulations
- Output is RiverWare Data Format (RDF) file

Concurrent MRM

- Simple example:
  - A policy study might include three rulesets (expressing the proposed policies) and five input DMIs (representing the hydrologic scenarios to evaluate the policies)
  - RiverWare would run the fifteen resulting simulations

MRM Configuration

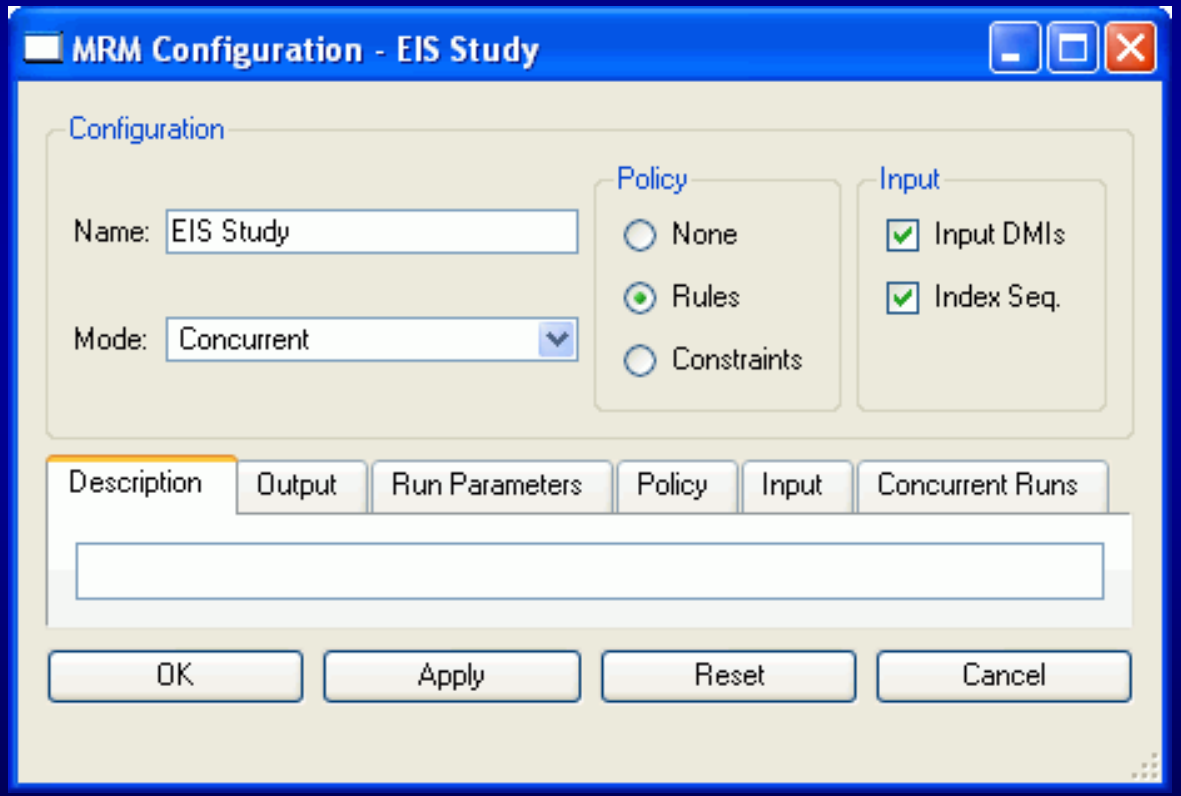
- Manage multiple named configurations
- Run selected configuration



MRM Configuration

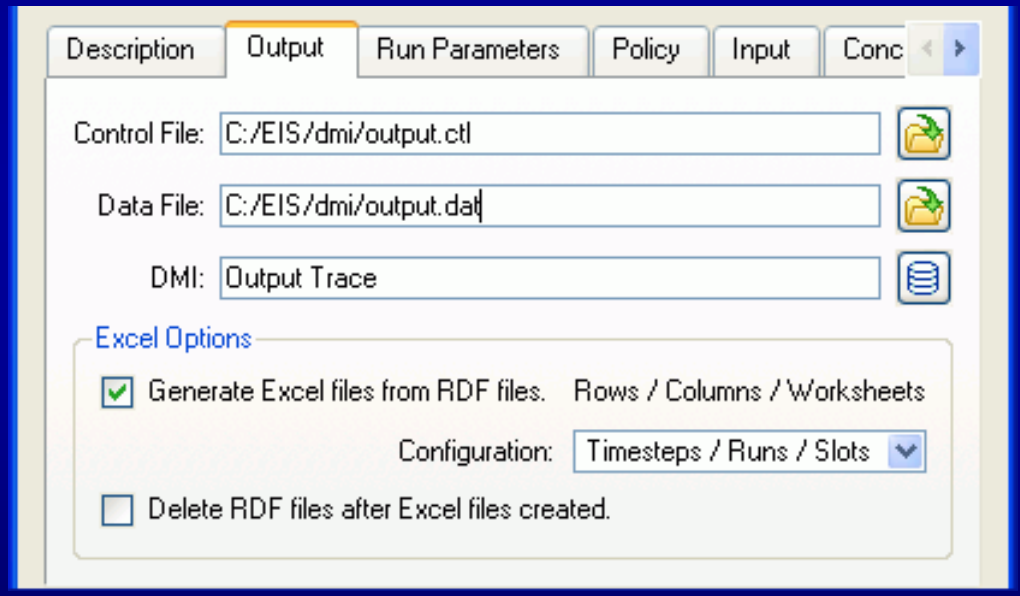
Specify:

- Configuration name
- Configuration mode
- Inputs being provided (with a dialog tab displayed for each)



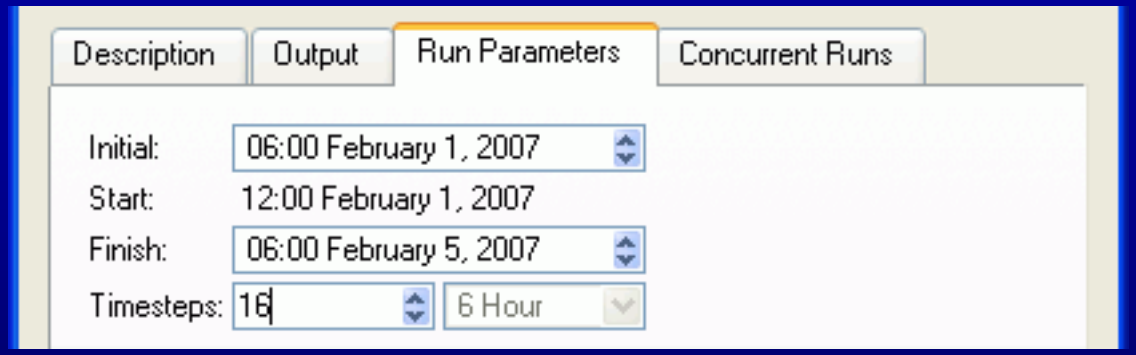
MRM Configuration

- Control file specifies slots written to RDF file
- Data file specifies RDF file
- Output DMI invoked after each simulation run
- On Windows generate Excel directly (otherwise use ExcelWriter)



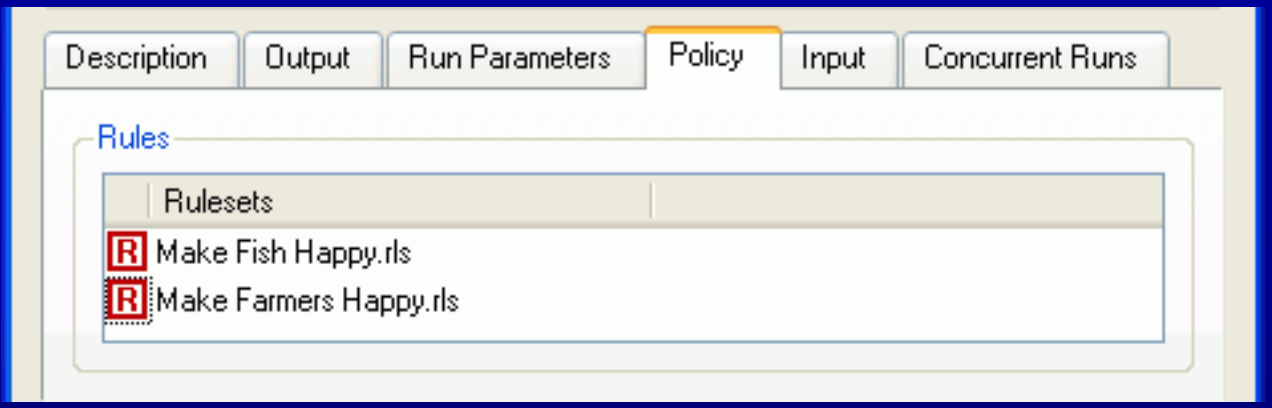
MRM Configuration

- Specify the run parameters (excluding the timestep)



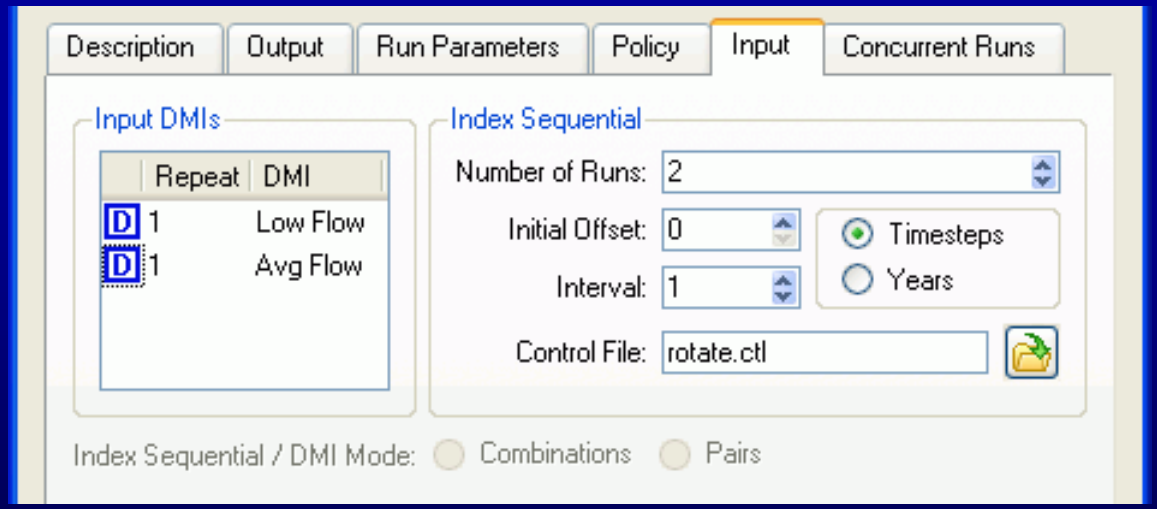
MRM Configuration

- Specify the rulesets expressing the policies



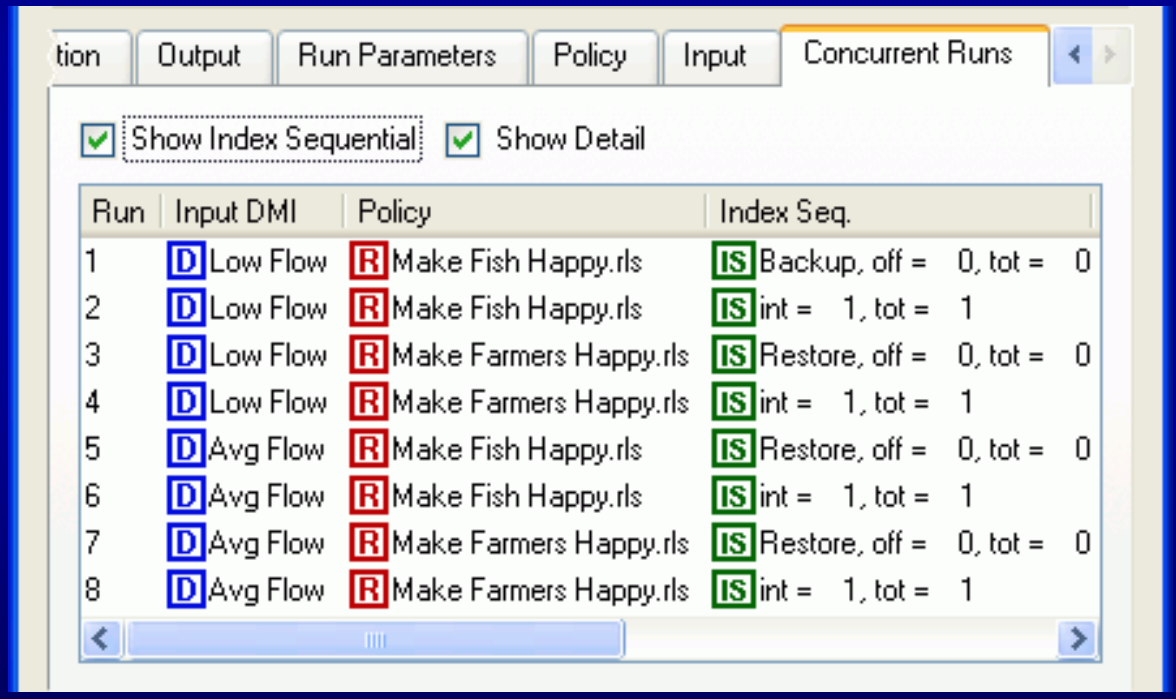
MRM Configuration

- Specify input DMIs and repeat counts
- Specify index sequential parameters – number of runs, initial offset (applied before first run), interval (applied before subsequent runs) and control file (identifying slots to rotate)



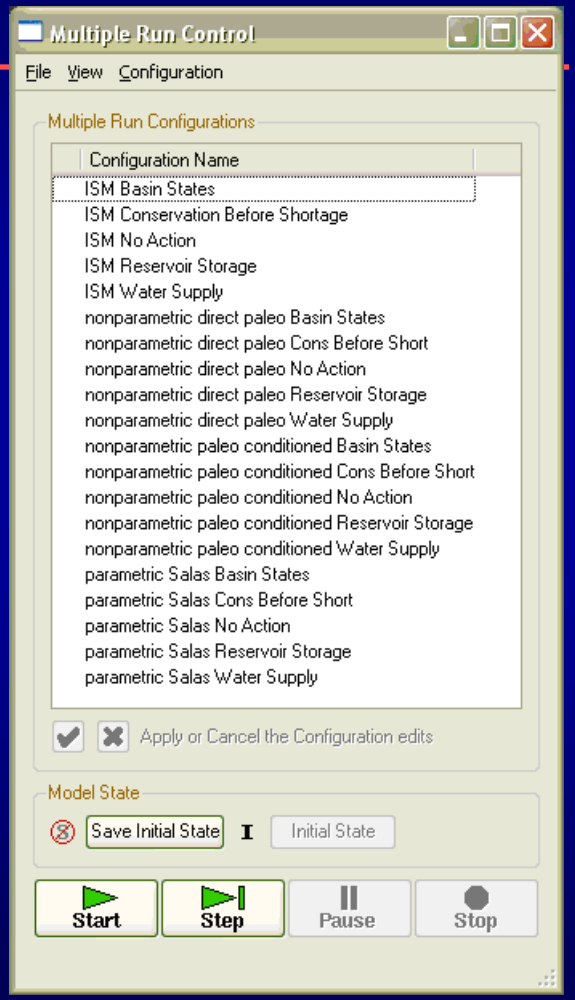
MRM Configuration

- See the resulting runs



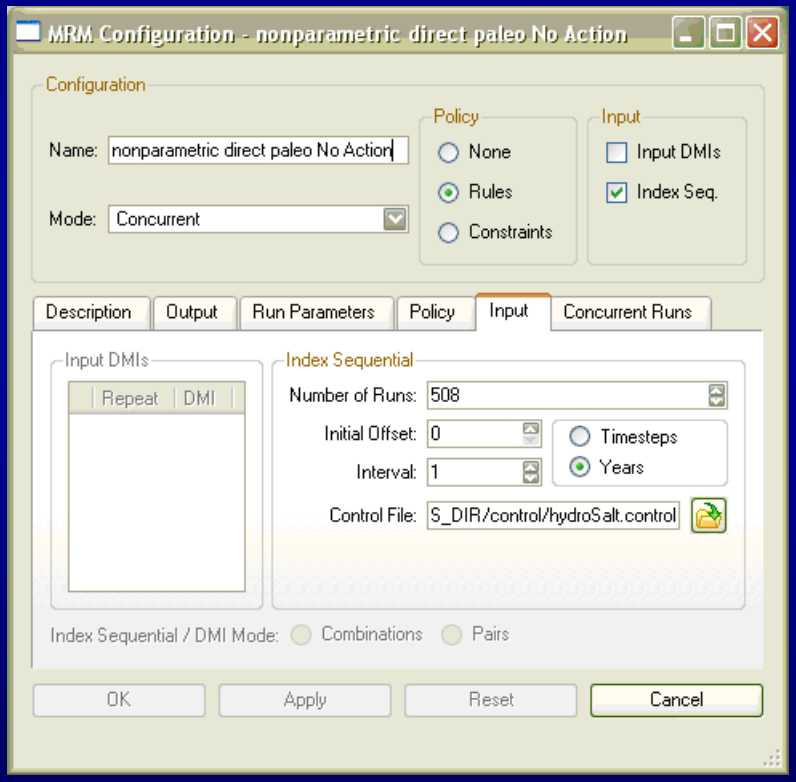
Recent MRM Implementation

- 5 proposed policies
- 4 hydrologic inflow scenarios
  - ISM based (Ouarda et al., 1997)
    - Historic flow (1906-2004)
      - 99 traces
    - Paleo flow (1490-1997)
      - 508 traces
  - Input DMI and ISM based
    - Paleo conditioned (Prairie, 2006)
      - 125 traces
    - Parametric stochastic (Lee et al., 2006)
      - 100 traces



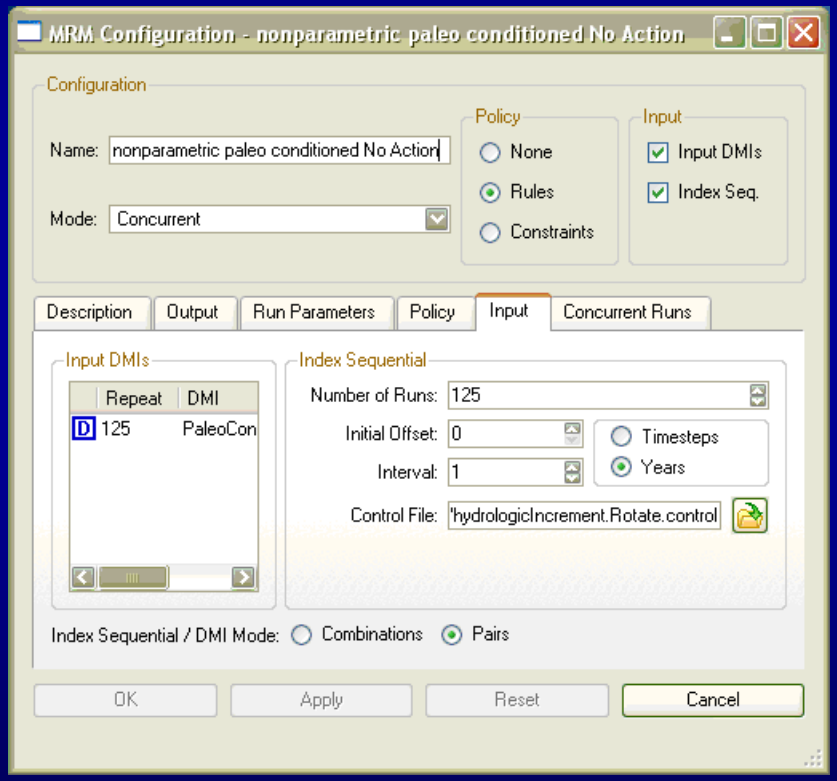
ISM stochastic technique

- Sequentially resamples blocks of flow data
- Can only produce
  - Observed flow magnitudes
  - Observed flow sequences
- Easily generates data for mutli-site model
- Easily preserves observed data statistics

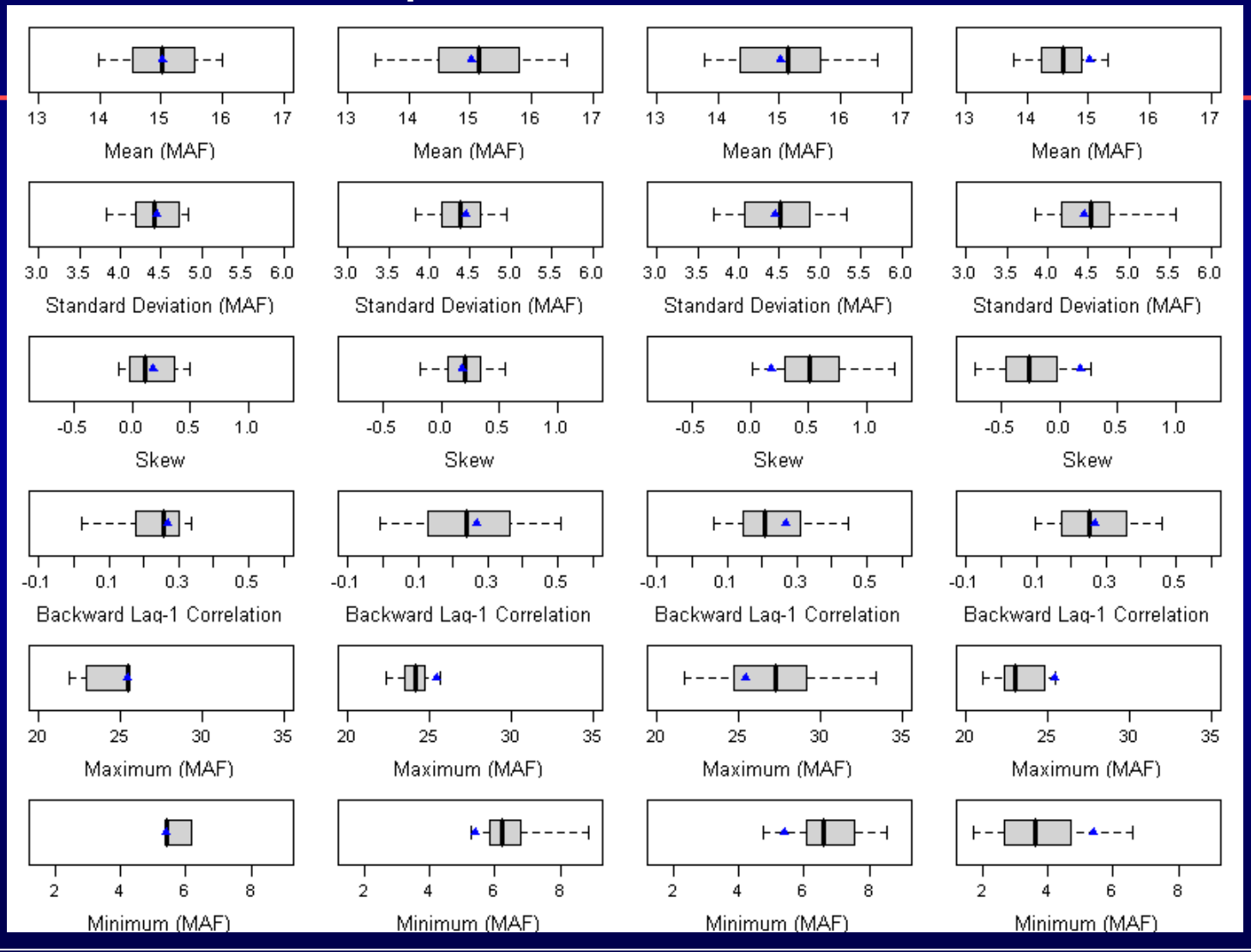


Alternate Stochastic Techniques

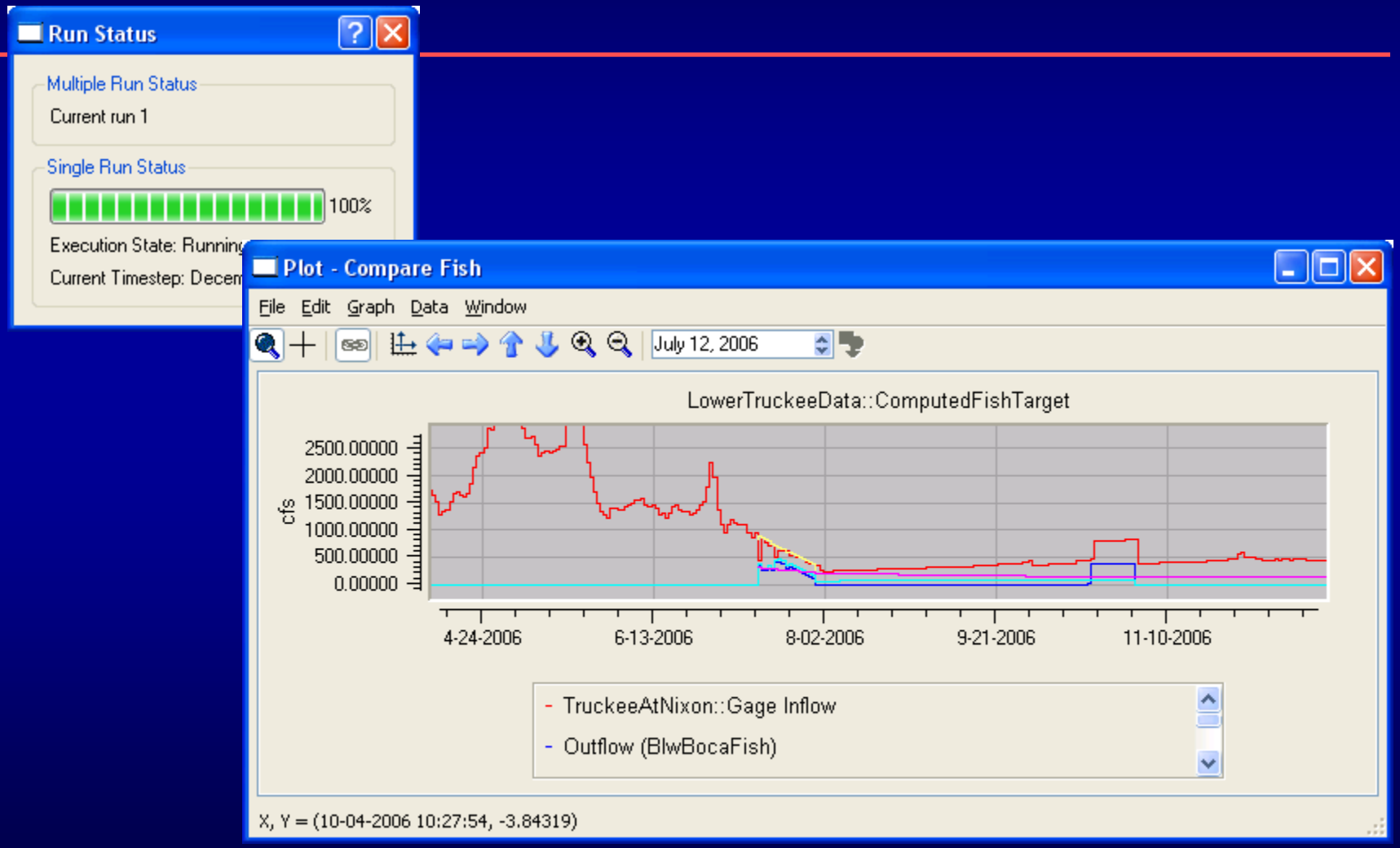
- Paleo conditioned
  - Combines observed and paleo streamflows
  - Generates
    - Observed flow magnitudes
    - Paleo-like flow sequences
- Parametric
  - Fit observed data to appropriate model (i.e., CAR)
  - Generates
    - Flow magnitudes not observed
    - Observed-like flow sequences



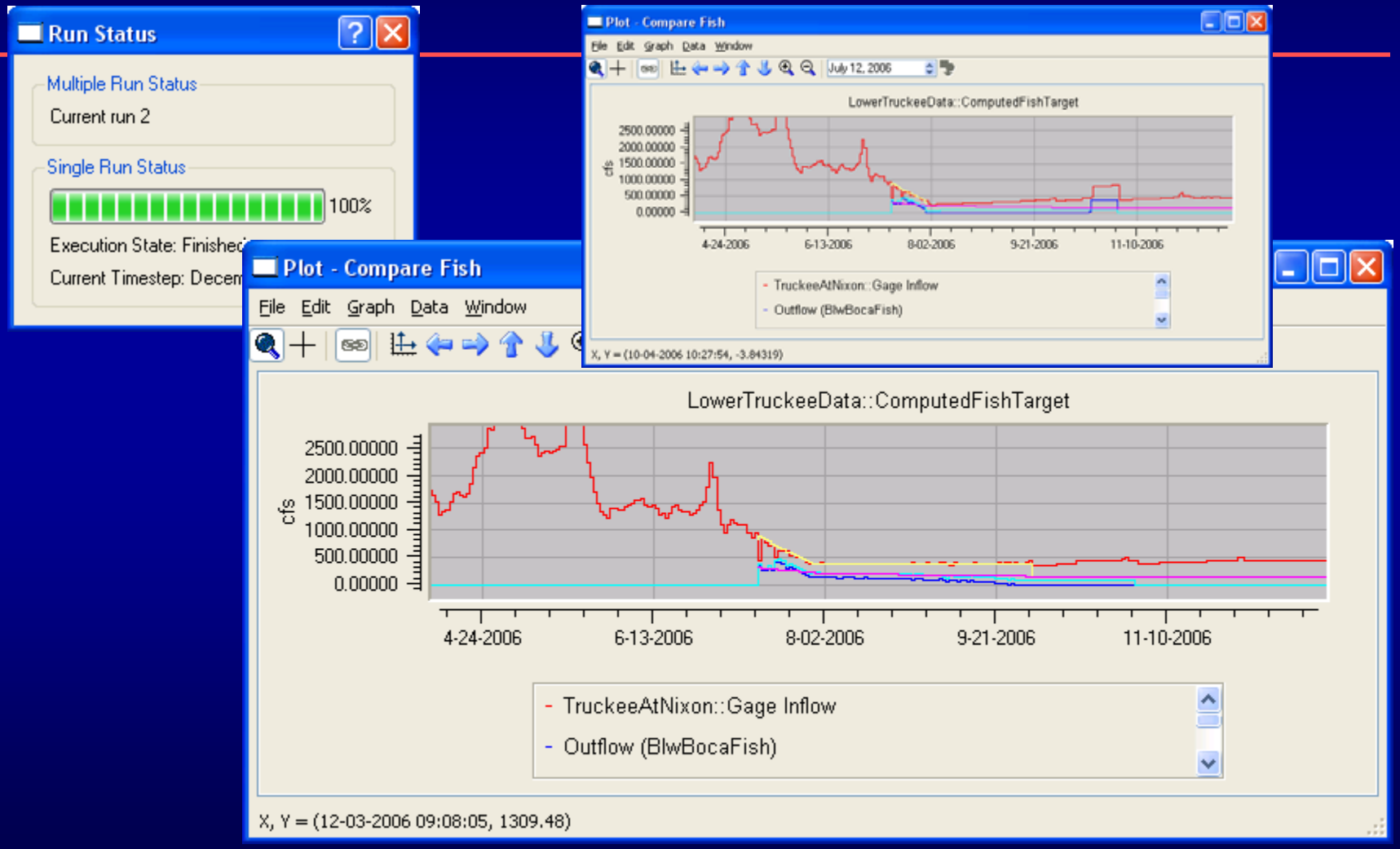
Observed ISM	Paleo conditioned input DMI	Parametric input DMI	Direct Paleo ISM



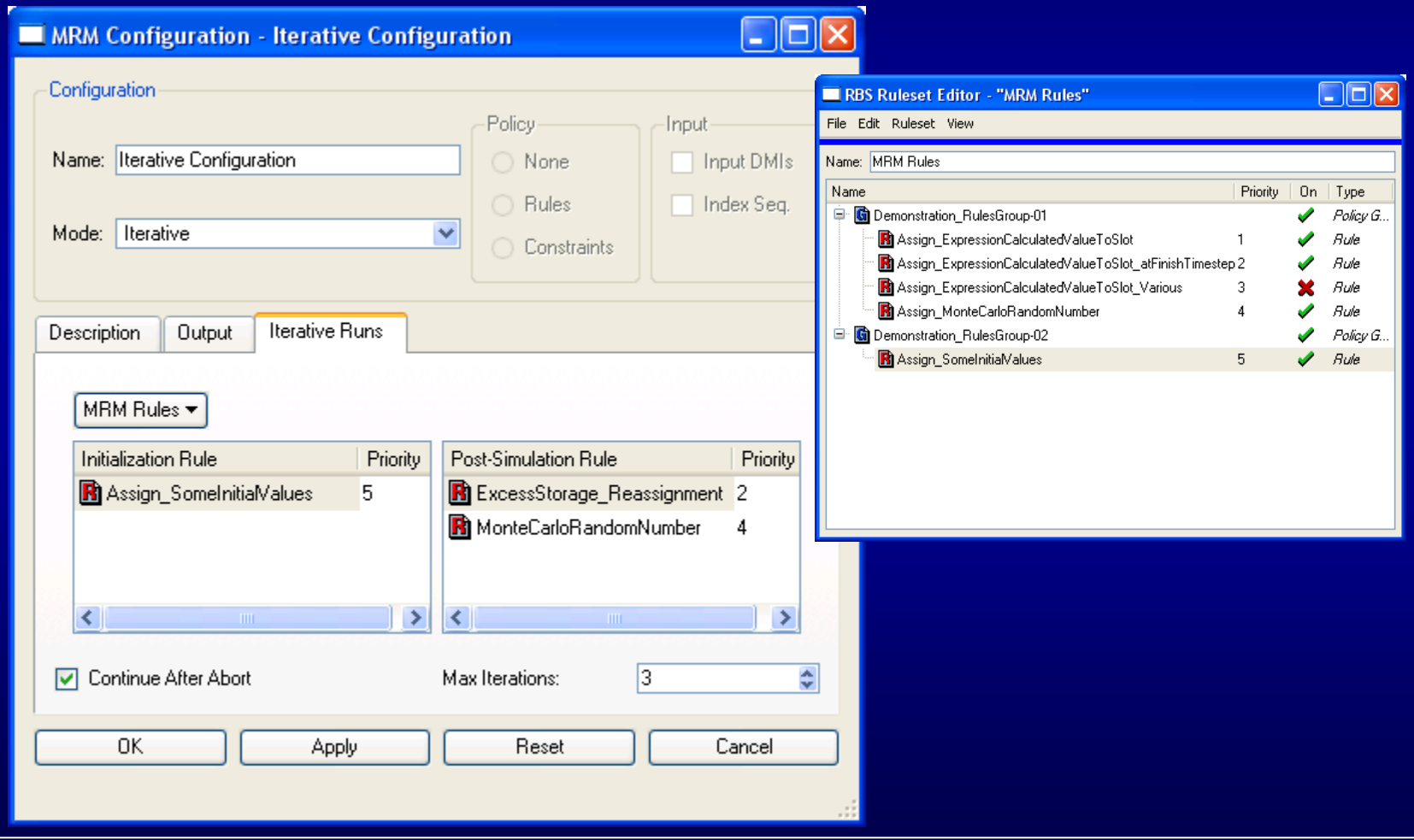
Iterative (RPL-controlled) MRM



Iterative (RPL-controlled) MRM



Iterative (RPL-controlled) MRM



Iterative (RPL-controlled) MRM

An iterative run executes as follows:

- Initialize the iteration count.
- Execute the initialization rule(s), if specified.
- Perform the simulation run.
- Execute the post-simulation rule(s), if specified.
- If the post-simulation rule(s) return “no change”, that is they do not assign one or more new (different) values, the iteration is complete.
- Otherwise, the iteration count is checked. If it equals the maximum number of iterations specified, then the iteration is complete also.
- If the iteration is not complete, then increment the iteration count and return to step 3 above.