Uncertainty

Test Bed Leaders

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Test Bed Description

Hydrologic uncertainty can be described in terms of uncertainties in model inputs, model parameters, and model structure; leading to uncertainties in model states and fluxes. Characterization of uncertainty may be accomplished through ensemble methods; reduction of uncertainty may be accomplished with data assimilation methods.

Basins: TBD; suggest a subset of the MOPEX basins, scattered across diverse climate regimes.

Space/time scales of interest: Basins ranging in size from ~500 to 20,000 km2; initially just model simulation, but with a view to streamflow forecasts at lead times from days through to seasons.

Experimental Design

- characterizing model uncertainty (e.g., ensemble model simulations)

  Testbed participants will be asked to produce estimates of uncertainty of each model state variable and model flux at each model time step and each sub-basin. Participants should provide model output in a prearranged format (e.g., NetCDF files containing all model states and fluxes with dimension (time, sub-basin, ensemble member) or dimension (time, sub-basin, mean, variance). These files may be used for the data assimilation task.

- data assimilation

  Testbed participants will be asked to update model simulations with observations of streamflow and snow water equivalent. Participants should provide (i) estimates of errors in observations; and (ii) estimates of the mean and uncertainty in each model state variable and model flux. Participants should provide output in an identical format to the uncertainty files.

Key Scientific Questions

What are the advantages and limitations of different methods for characterizing and reducing uncertainty in hydrologic model simulations?

Data Resources

Testbed leaders will provide a hydrologic model (e.g., the distributed SNOW-17/Sacramento model) configured for several basins in different climate regimes (e.g., DMIP basins, MOPEX basins, etc.). This will include the input datasets (prcp, temp), ancillary datasets on soils, vegetation, etc., and the topology of the channel network.

This model will be configured as a “black-box” with wrappers around it.