# Development of probabilistic streamflow forecasting methods

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The standard streamflow forecasting approach involves running a hydrologic model up to the start of the forecast period to estimate basin initial conditions (e.g., snowpack, soil moisture), and then running the model into the future, with an ensemble of meteorological forecasts, to produce probabilistic forecasts of streamflow. This approach permits a probabilistic treatment of meteorological forecasts, but all other components of the system are entirely deterministic. For example, the approach assumes there is no uncertainty in model estimates of the basin snowpack. Since the predictability of streamflow in snowmelt-dominated basins is intimately tied to knowledge of the snowpack, it is extremely important to account for the uncertainties in snowpack estimation. This presentation will summarize methods to explicitly include and propagate uncertainties in model forcings, model parameters, and model structure, as well as the development and application of ensemble data assimilation methods that use observations to update model snowpack estimates.