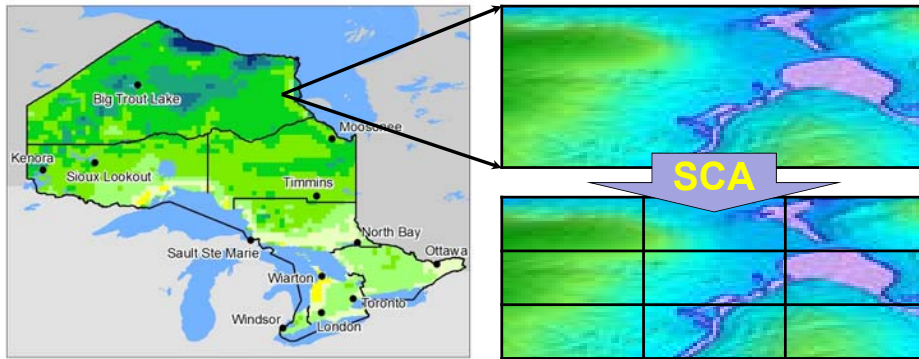


Water Resources Systems Analysis

Water resources management (WRM) is challenged by the different scale between regional climate modeling and hydrological prediction, the uncertainty and dynamics of hydrological events, as well as the inexactness and interaction of WRM system components. To increase the reliability of decision support for WRM under multiple complexities, Mr. Guanhui Cheng made progresses in weather forecast, hydrological prediction, and WRM programming methodologies successively.

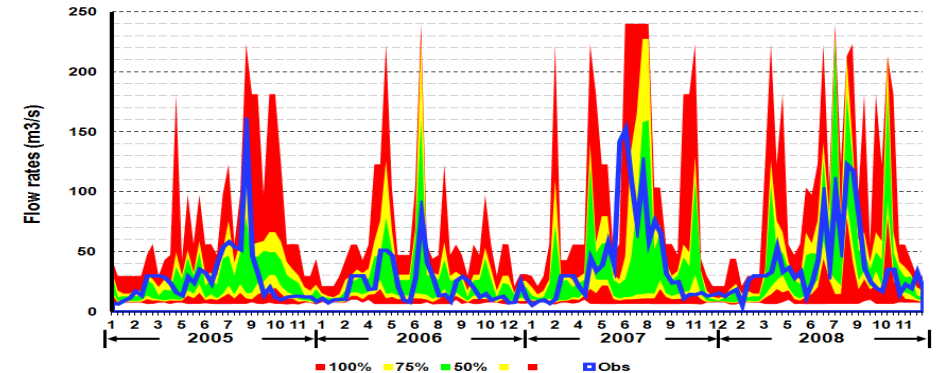
1. SCA-based Downscaling Technique for Weather Forecast

Through the cooperation of team members, a **Stepwise Cluster Analysis** based downscaling technique was developed for the forecast of daily precipitation and temperature series in higher spatial resolution



2. Inexact Time Series Analysis for Hydrological Prediction

On the basis of weather forecast results, a SCA-Markov time series analysis technique was proposed for achieving the dynamic prediction of flow rates in varied time scales under uncertainties



3. Improved Interval Linear Programming for Water Resources Management

Given the availability of water resources, three IILP methods were developed for WRM under complexities of uncertainties and interactions. Method A could reflect the correspondence between crisp values of decision variables and the objective function with the fluctuation of interval coefficients. Methods B and C avoided the absolute violation of constraints, based on nonlinear programming and the Shrinking Ratio of Constraints, respectively.

