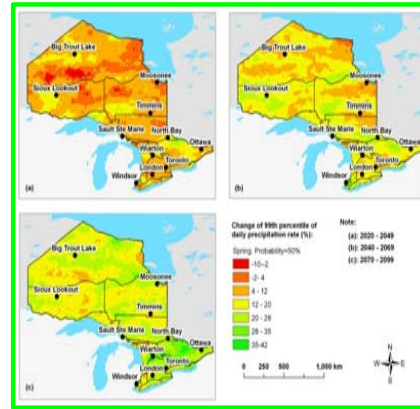


# Water Resources System Analysis under Climate Change

Adequate freshwater supplies are fundamental in ensuring the sustainability of agriculture, industry and the natural environment. However, global water resources are under increasing pressure due to climate, population and land use change. Water deficits can result in droughts, agricultural supply shortages and the potential of international tension, whereas surpluses can result in flooding. The quantity, quality and timing of water supplies are therefore pervasive issues which affect all scales from the individual through to the global.

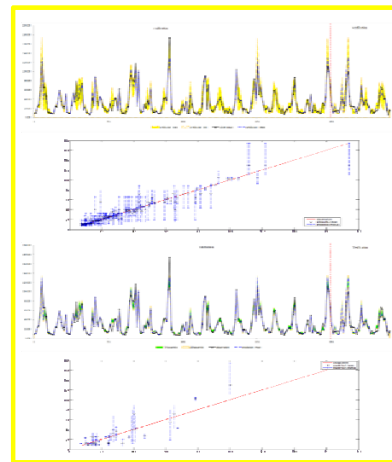
## High-Resolution Precipitation Projection

Precipitation downscaling improves the coarse resolution and poor representation of precipitation in global climate models and helps end users to assess the likely hydrological impacts of climate change. Consequently, a dynamic (i.e. PRECIS) and a statistical downscaling (stepwise cluster analysis) methods was integrated to produce high-resolution precipitation project in Ontario.



## Hydrological Process Analysis under Changing Climatic Conditions

Hydrological process in the Three Gorges Reservoir area was influenced dramatically due to the construction of the Three Gorges Dam and changing climate. Therefore, an integrated analysis method based on wavelet transform, Copula functions and entropy method was developed to quantify the variability in hydrological time series. Furthermore, an inexact hydrological prediction method was developed based on stepwise cluster analysis



## Groundwater Simulation and Risk Assessment

An integrated groundwater simulation model was developed based on the soil and climate conditions in the prairie; this unique model facilitates quantification of risks associated with uncertainties in source, medium, and impact conditions, as well as exploration of inexact simulation-optimization methodologies for supporting process control of remediation practices



## Other Related Projects

- Improved Water Resources Management and Drinking Water Safety in Rural Regions of China, UNDP
- Integrated system characterization theory and ecological control mechanism for modern urban diseases, National Basic Research Program (973) of China
- A simulation-optimization aided network modeling system for watershed management under changing climatic conditions, NSERC
- Sustainable Water Use Model Development in the R.M. of Edenwold and Nearby Communities, Saskatchewan Ministry of Environment