



# HUA ZHANG

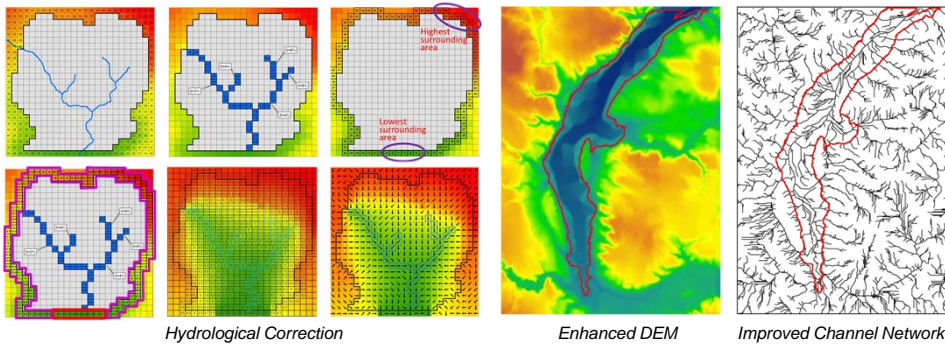
## Integrated Modeling of Prairie Hydrology and Water Quality under a Changing Climate

Small prairie watersheds are vulnerable to climate change due their unique geographical, hydrological and socio-economic characteristics. Based on field surveys and modeling studies in southern Saskatchewan, my research aims to develop a set of integrated characterization, simulation and risk-assessment methods for examining the impacts of climate change on the hydrology and biogeochemistry of small prairie watersheds.



### Characterization of watershed channel network

- Hydrological correction: RBF interpolation with multiple elevation datasets
- Geomorphologic assessment: flow-direction heterogeneity and drainage density



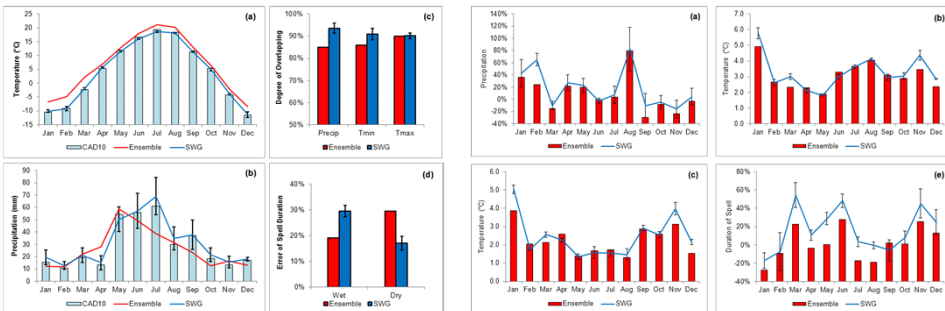
Hydrological Correction

Enhanced DEM

Improved Channel Network

### Two-step climate change projection

- Weighted multi-RCM ensemble simulation at the regional scale
- Stochastic weather generation at the station scale

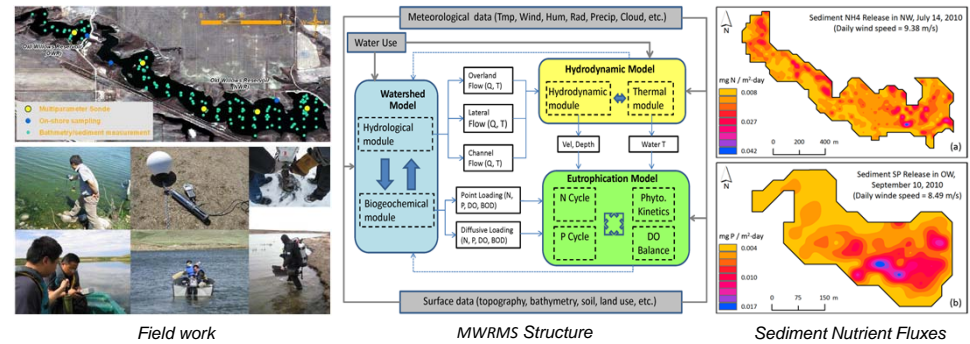


RCM-Ensemble Validation

SWG Validation

### Integrated hydrological-biogeochemical simulation

- Multi-level Watershed-Reservoir Modeling System (MWRMS)
- Willows Reservoir Eutrophication Model (WREM)



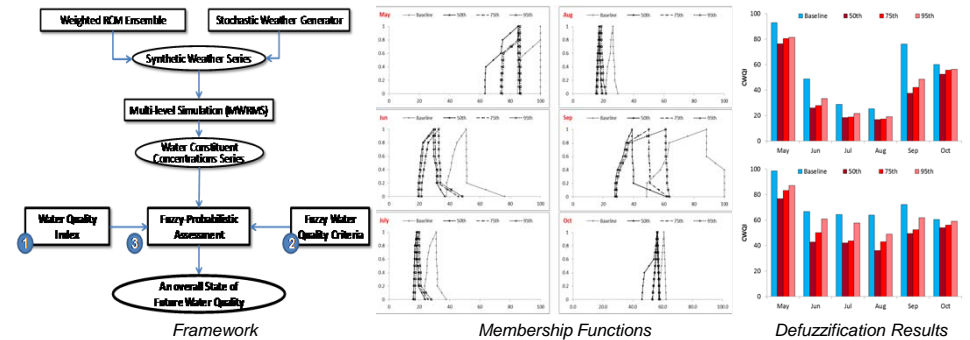
Field work

MWRMS Structure

Sediment Nutrient Fluxes

### Water quality assessment under climate change

- Simulation-based fuzzy-probabilistic risk assessment
- Risks of soil water deficiency and reservoir water quality degradation



Framework

Membership Functions

Defuzzification Results