

FEWS Configurations in the Toronto Area



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FloodNet



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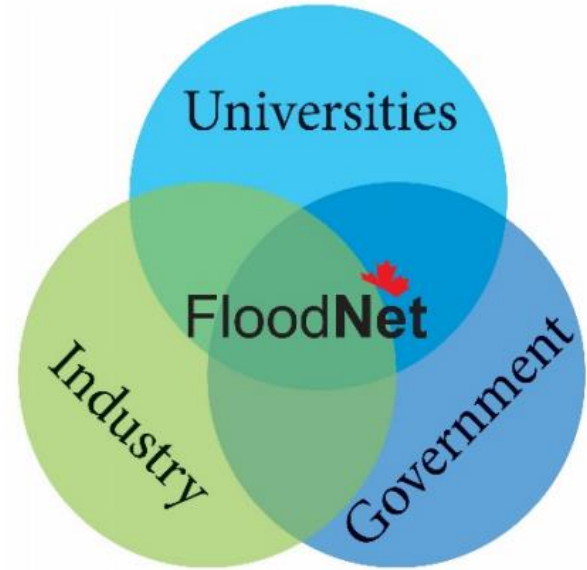
@NSERCFloodNet



FloodNet

FloodNet Project

- A multi-disciplinary research network
 - For:
 - Enhanced flood forecasts for all across Canada
 - By:
 - Academic experts
 - Government scientists
 - Operational flood forecasters (end-users)



Examples of FloodNet Research Projects

- Theme 1
 - Flood regimes in Canada: Learning from the past and preparing for the future
- Theme 2
 - Quantifying and reducing the predictive uncertainty of floods
- Theme 3
 - Development of Canadian Adaptive Flood Forecasting and Early Warning System (CAFFEWS)
- Theme 4
 - Risk analysis of physical, socio-economic, and environmental impacts of floods

Examples of FloodNet Research Projects

- Theme 1
 - Flood regimes in Canada: Learning from the past and preparing for the future
- Theme 2
 - Quantifying and reducing the predictive uncertainty of floods
- Theme 3
 - Development of Canadian Adaptive Flood Forecasting and Early Warning System (CAFFEWS) → Use Delft-FEWS platform
- Theme 4
 - Risk analysis of physical, socio-economic, and environmental impacts of floods

FEWS Configurations in Toronto Area

Purpose

- Not for practical operations, but for research purposes
 - Hindcast rather than a real-time forecast
 - Multi-model configuration
 - Capable of integrating external research components from our research group
 - Such as data assimilation and Bayesian forecasting system
- Still under development

Forecast Archive

- CaSPAr (<http://caspar-data.ca/>)
 - Available products: [LINK](#)



- Humber River Watershed

- ## ■ Don River Watershed

-
- The map displays the Humber and Don regions, with the Humber region outlined in red and the Don region outlined in blue. The Humber region contains 24 stations (HY030, 02HC047, 02HC051, HY012, HY037, 02HC023, HY038, HY039, HY054, HY053, HY041, HY035, 02HC031, HY014, 02HC003, HY076, 02HC027, HY003, HY016, HY083, HY069, HY070, HY036, HY017, HY027, HY018, HY062, HY019, HY015, HY010, HY009, HY008, HY007, HY006, HY005, HY004, HY003, HY002, HY001, HY000). The Don region contains 12 stations (02HC047, 02HC051, 02HC023, 02HC025, 02HC009, 02HC031, 02HC003, 02HC027, 02HC009, 02HC031, 02HC003, 02HC027). The map also shows major roads like 400, 401, and 407 ETR, and cities like Brampton, Mississauga, and Toronto.

Hydrologic Models and Adapters

Raven

- Model developed by U of Waterloo
- Adapter developed by BC Hydro
- Adapter modified by McMaster U
 - NetCDF data transfer with Raven
 - Updated state file (_solution.rvc) fed to Delft-FEWS



CHPS

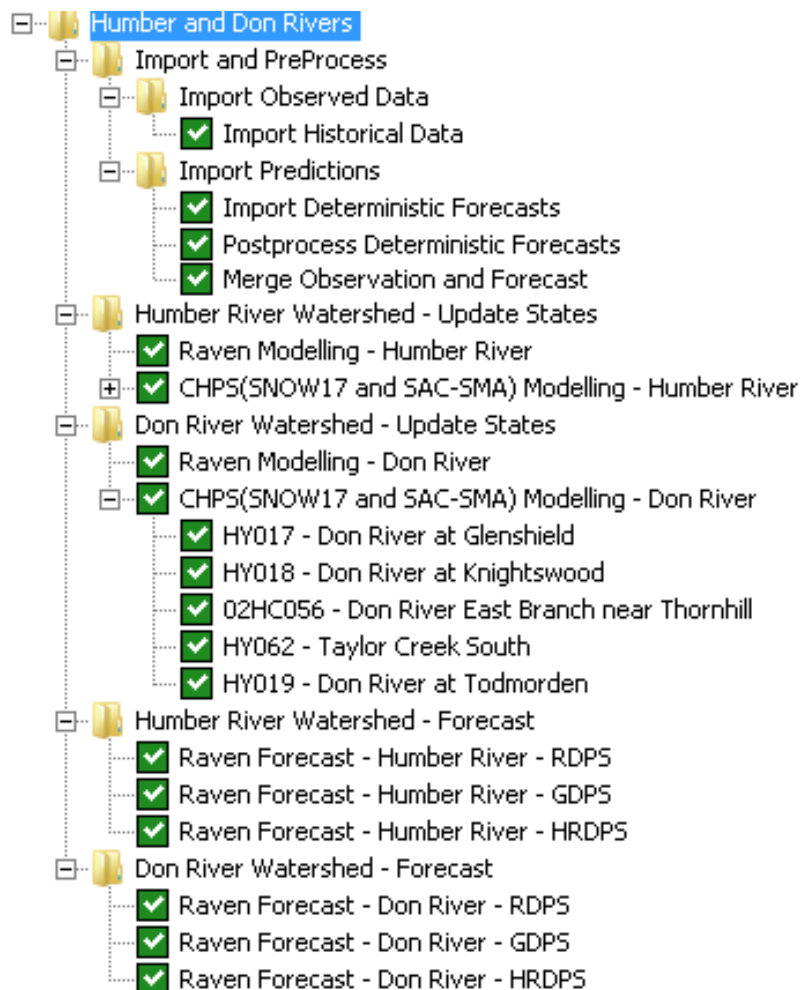
- NWS CHPS adapter is used
- OHDFewsAdapter
 - SNOW-17
 - SAC-SMA
 - Unit Hydrograph
 - Channel Routing (Lag-K)
 - Etc.



Configuration

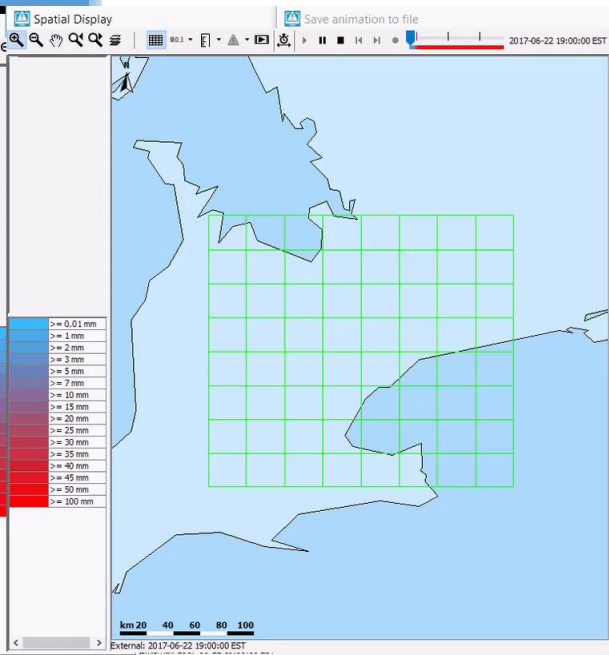
■ Topology

- Import historic data
- Import archived forecasts
- Raven model
- CHPS
- Update states
- Run deterministic hindcast
 - RDPS (~72hr)
 - GDPS (~72hr)
 - HRDPS (48hr)

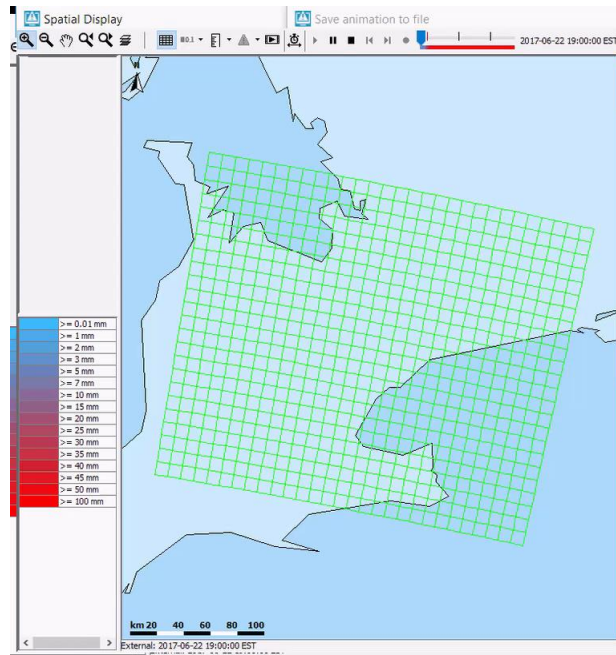


Deterministic Forecasts: Acc. P.

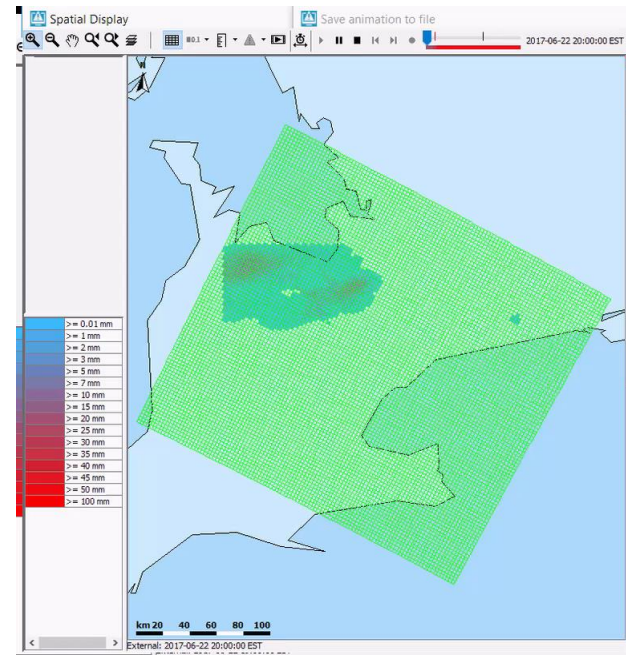
GDPS (0-72hr)



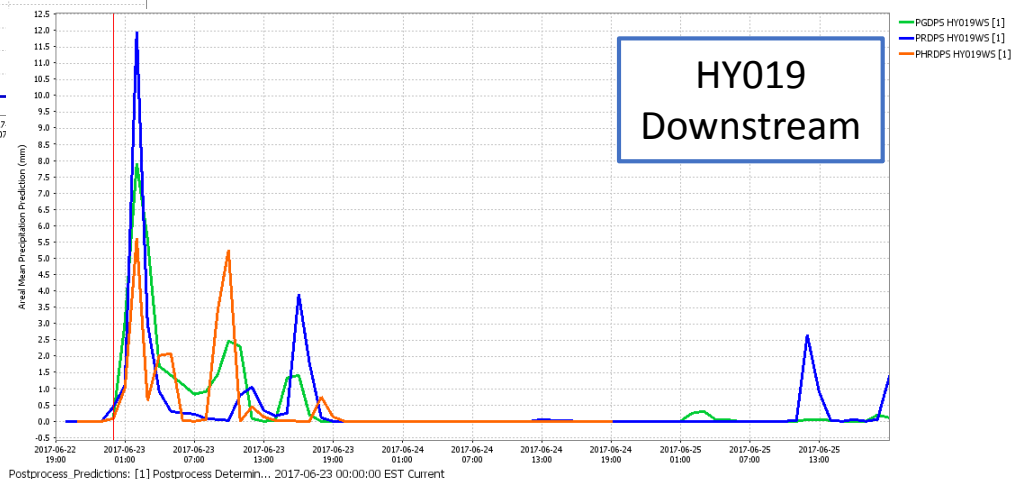
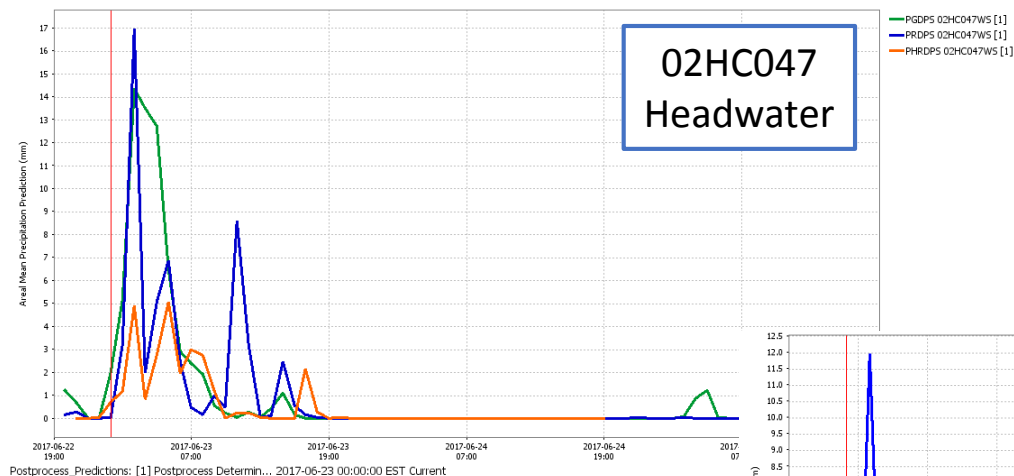
RDPS (0-72hr)



HRDPS (1-48hr)



Deterministic Forecasts: Mean Areal P.



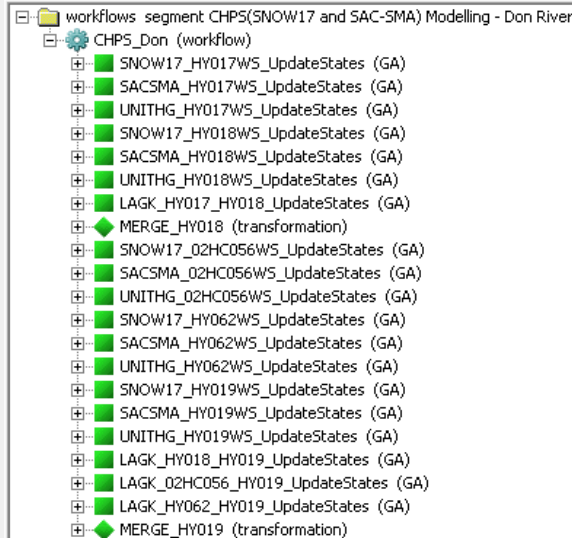
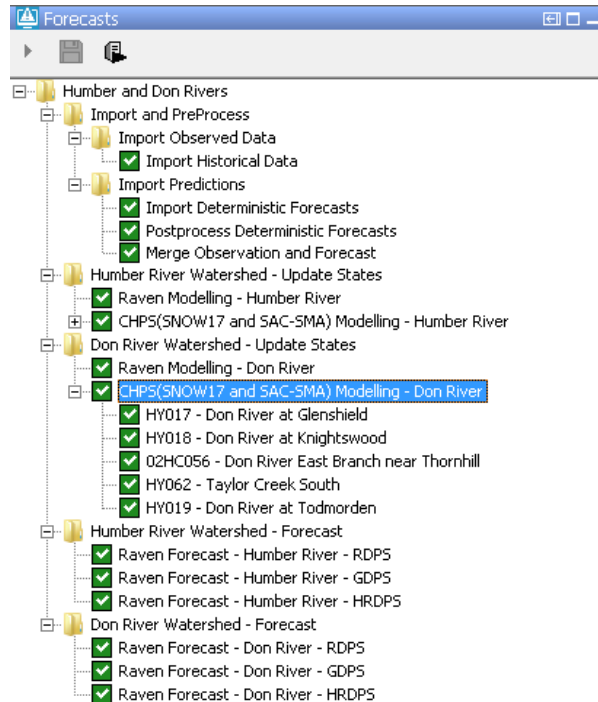
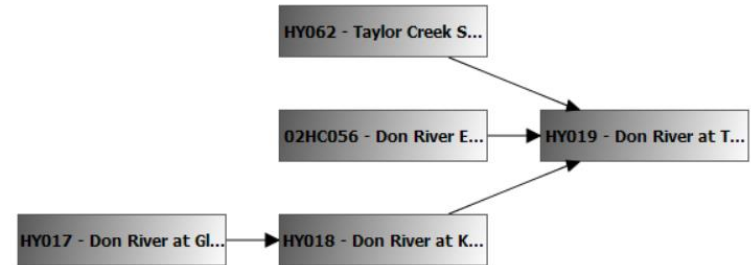
GDPS (0-72hr)

RDPS (0-72hr)

HRDPS (1-48hr)

Configuration

■ CHPS: Semi-distributed internally

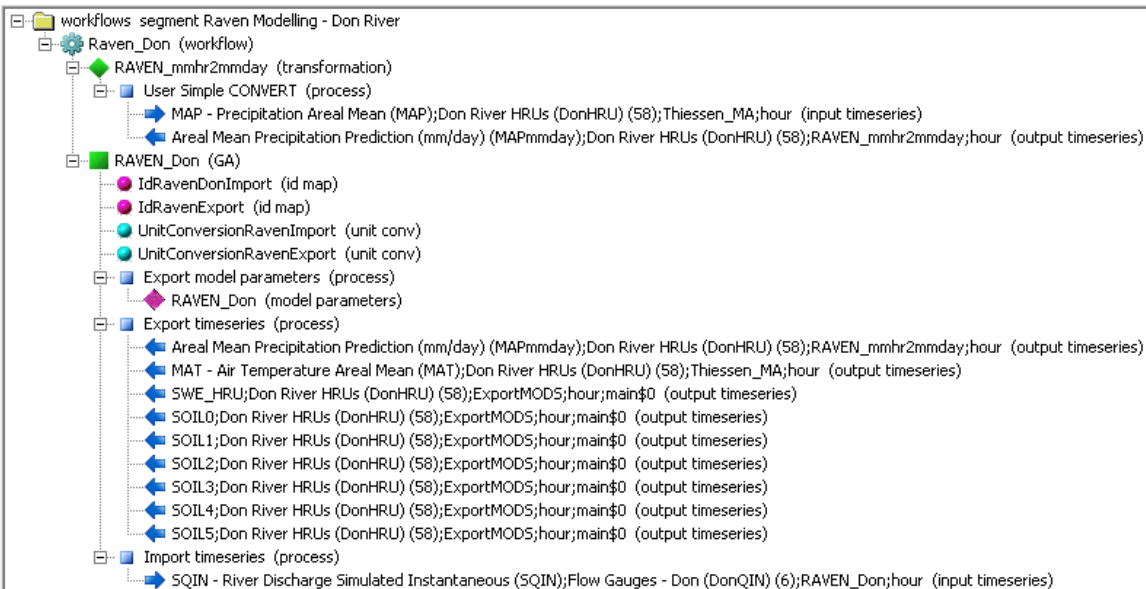
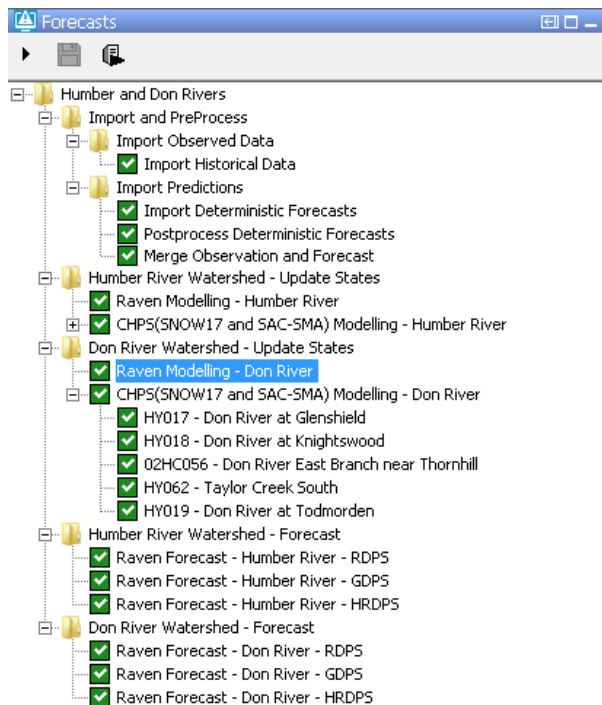


Configuration

Raven adapter (python):

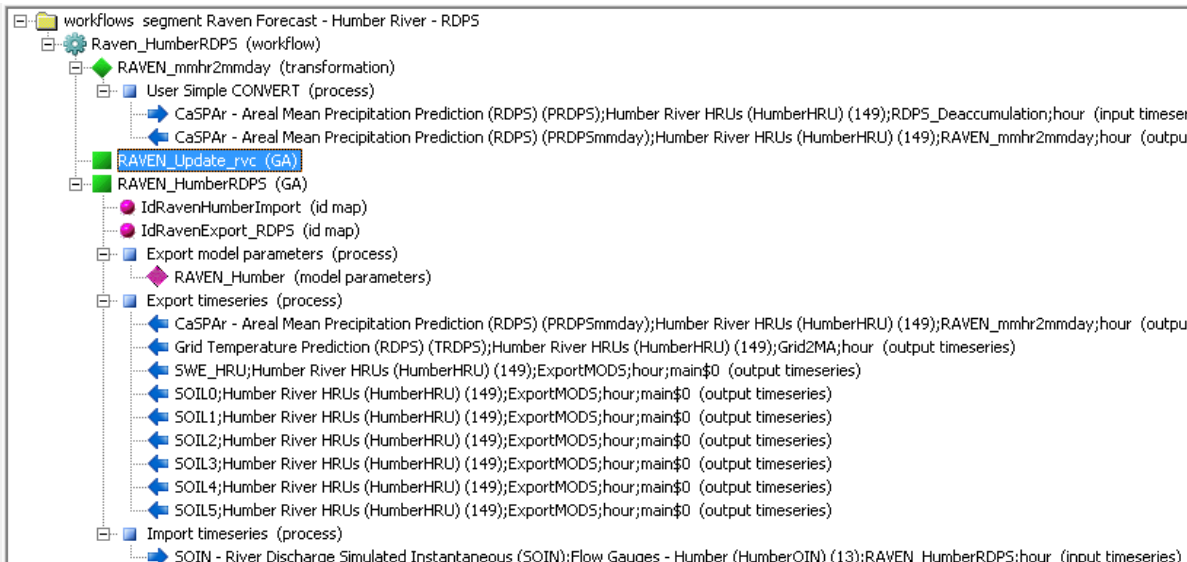
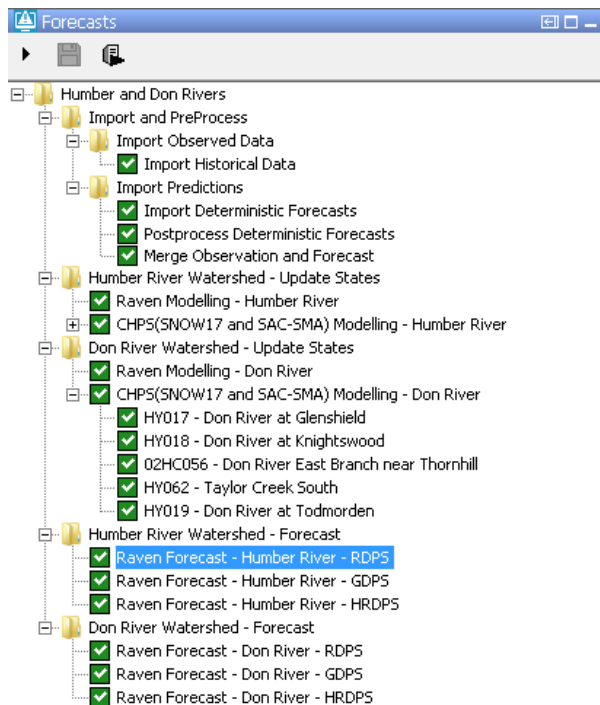
One adapter does all pre-processing, executing, and post-processing

■ Raven model: Semi-distributed externally



Configuration

- Raven State Updating: GA runs an external python script



Future Works

- Batch Forecast
- Adapt other hydrologic/hydraulic models
- Integrating enhanced forecasting components from our research group
 - Data Assimilation (beyond OpenDA)
 - Bayesian Forecasting System

Thank you

