INNOVATION PARTNERSHIPS
UNIVERSITY OF MICHIGAN

Advanced Forecasting Tool for Great Lakes Water Supply Using Climate and Hydrology Data

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Category
Software
MOSS - Michigan Open Source Support

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OVERVIEW

Advanced software for accurate Great Lakes net basin supply and water level prediction

- Integrates climate, hydrology data, and modern predictive modeling for improved forecast accuracy
- Great Lakes water management, flood planning, infrastructure resilience, navigation, ecosystem protection, stakeholder decision support

BACKGROUND

The Great Lakes system is central to regional water resources, economic development, and environmental sustainability, but predicting its water levels remains an ongoing challenge. Traditionally, water supply forecasts have relied on historical data, regression models, or simple hydrologic equations, but these often fail to capture the complexity of interactions between climate, precipitation, evaporation, and runoff. Current forecasting approaches can struggle with representing initial basin conditions, accounting for climate variability, and estimating uncertainty, especially during extreme events. This has left agencies like the U.S. Army Corps of Engineers and Environment and Climate Change Canada with limited tools for long-term and robust water level forecasting. With increasing climate variability and the growing need for

resilient water management, there is a clear demand for advanced, data-driven methods that accurately project water supplies and inform resource planning across multiple time scales.

INNOVATION

The NBS-Predictor represents a significant leap forward in water supply modeling for the Great Lakes. By harnessing advanced climate and hydrology datasets, the software employs state-of-the-art Gaussian Process techniques and other data-driven models to predict critical components like precipitation, evaporation, and runoff. This integrated approach allows for accurate, subseasonal-to-annual forecasts, accounting for both typical and extreme conditions. The software stands out for its robust data integration, sophisticated uncertainty estimation, and ability to align forecasts with real-time climate variability and initial basin conditions. Designed with stakeholder input and iterative testing, NBS-Predictor directly supports operational agencies in effective water level management and disaster resilience planning. Real world applications include guiding infrastructure investments, improving navigation planning, enhancing ecosystem protection strategies, and informing policy decisions for both U.S. and Canadian agencies managing the Great Lakes system.

ADDITIONAL INFORMATION

PROJECT LINKS:

- NBS Predictor Github

DEPARTMENT/LAB:

- Dani Jones, School for Environment and Sustainability

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