

Great Lakes Hydrology Modeling with the Advanced Hydrologic Prediction System

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The Large Basin Runoff Model, Lake Thermodynamic Model, trans-watershed water balances, routing models, and regulation models are used at the Great Lakes Environmental Research Laboratory (GLERL) to estimate basin runoff, lake evaporation, channel flows, and lake levels in the Great Lakes for use in long-term routing determinations, water resource operation decisions, operational hydrology studies, and long-term forecasting. Data availability over large areas, large-basin applicability, computation requirements, and model application costs often preclude the use of detailed watershed models, designed for small scales, for large-scale applications. The GLERL applies the Large Basin Runoff Model to each of the 121 watersheds in the Great Lakes basin and applies the Lake Thermodynamics Model to the 7 main water bodies and use both with water balances, routing, and regulation models in their forecasting and simulation packages. The former is the Great Lakes Advanced Hydrologic Prediction System (AHPS), used daily to make extended probabilistic forecasts of many hydrological variables, including lake levels, at GLERL and at several US and Canadian agencies concerned with operational decision making. The latter uses AHPS at GLERL in many of their climate change impact assessments and management evaluations.

