Data Assimilation in Operational Watershed Models for Short and Long-term Hydrologic Forecasting

Proposal to the Department of Commerce, NOAA and the NWS
Hydrologic Research – CFDA #11.462
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$284,785

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Abstract

Uncertainty in model states greatly impacts the accuracy of streamflow predictions on a variety of time and space scales. Model initialization for many operational forecast basins is conducted in an informal manner based on recent observations of streamflow and snowpack. Automated data assimilation methods can provide objective guidance for model state adjustments. This proposal will address the NWS Office of Hydrologic Development hydrologic modeling priorities of "assimilation of streamflow, soil moisture and snow products" as well as improving "ensemble streamflow forecasting". We will develop and test an Ensemble Kalman Filter (EnKF) method to update National Weather Service (NWS) operational hydrologic model states for snow dominated basins using streamflow and SNOTEL observations. Ensemble streamflow prediction hindcasting techniques will be used to assess the potential impact of the automatic updating scheme on current operational forecast skill. Initial testing will be conducted on the American River basin and later extended to other operational forecast basins in the Western U.S. Throughout the project, guidance for data assimilation framework will be solicited from NWS personnel at all agency levels. The proposed system design is intended to be modular and transferable to any NWS River Forecast Center. The system will also provide some degree of user control to meet the requirements of specific operational forecast settings.