Leveraging Ground and Remotely Sensed Observations for Short-Term Streamflow Forecasting

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Abstract: Methods to improve streamflow forecast using state-parameter-forcing update schemes have been actively researched for many years. However, key technical challenges and practical merits in real applications have not been well communicated. Much of the challenges originate from our limited knowledge of model and observation uncertainties, incomplete representation of the uncertainties due to the model structure, non-linear error propagation and, for some cases, real-time/forecast forcing errors dominating the overall streamflow forecast uncertainties. We present several stochastic data assimilation works applied to catchments with various level of annual rainfall, available monitoring stations and catchment size with an aim to improve the Bureau of Meteorology's continuous short-term flood forecast models. Two-tiered approaches developed for (relatively) well-monitored and data-sparse regions, respectively, are compared and discussions of how errors from various sources add up to the final apparent forecast uncertainty and the nature of the errors that can be corrected by the data assimilation are provided.

Keywords: *Flooding, Remote Sensing, Uncertainty, Data Assimilation*