

Challenges of Operational River Forecasters

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Abstract: Skillful and timely streamflow forecasts are critically important to water managers and emergency protection services. To provide these forecasts, hydrologists must predict the behavior of complex coupled human–natural systems using incomplete and uncertain information and imperfect models. Moreover, operational predictions often integrate anecdotal information and unmodeled factors. Forecasting agencies face four key challenges: 1) making the most of available data, 2) making accurate predictions using models, 3) turning hydrometeorological forecasts into effective warnings, and 4) administering an operational service. Each challenge presents a variety of research opportunities, including the development of automated quality-control algorithms for the myriad of data used in operational streamflow forecasts, data assimilation, and ensemble forecasting techniques that allow for forecaster input, methods for using human-generated weather forecasts quantitatively, and quantification of human interference in the hydrologic cycle. Furthermore, much can be done to improve the communication of probabilistic forecasts and to design a forecasting paradigm that effectively combines increasingly sophisticated forecasting technology with subjective forecaster expertise. These areas are described in detail to share a real-world perspective and focus for ongoing research endeavors.

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