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Linking seasonal streamflow forecast performance to operational value in emergency response settings

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In this work we investigate the operational value of seasonal streamflow forecasts for water reservoirs. We consider two different operating settings, namely continually adjusted and emergency response operations—the former represents systems for which the water release decisions are adjusted at frequent intervals, while the latter is typical of systems for which key management decisions are made relatively infrequently (e.g., urban water supply systems). We define the operational value as the difference between the long-term operating objective provided by forecast-informed operations—a rolling horizon, adaptive control approach—and more traditional operating rules. In a first set of experiments carried out in four contrasting catchments located in Australia, we use synthetic forecasts of different quality to show that the operational value increases with the forecast skill for continuously adjusted operations. By contrast, we find a weaker relation between forecast skill and value for emergency response settings. In a second set of experiments carried out with a modern experimental forecasting systems, called Forecast Guided Stochastic Scenarios (FoGSS), we show that the forecast value for emergency response operations can be largely explained by the forecast skill at the time during which critical release decisions are made.