

Overcoming data scarcity: Seasonal forecasting of reservoir inflows using public domain resources in Central Asia

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Management of large hydropower reservoirs can be politically and strategically problematic. Traditional flow forecasting techniques rely on accurate ground based observations, a requirement not met in many areas of the globe (Artan et al., 2007). In particular, access to real-time observational data in transnational river basins is often not possible. In these regions, novel techniques are required to combat the challenges of flow forecasting for efficient reservoir management. Near real time remotely sensed information regarding flow predictors (e.g. satellite precipitation estimates) could combat data availability issues, improving the utility of seasonal reservoir inflow forecasts.

This study investigates the potential for river flow forecasting using public domain resources, including satellite and re-analysis precipitation as well as climate indices for several strategically important reservoirs throughout Central Asia (including Toktogul, Andijan, Kayrakkum and Nurek). Using reservoir inflows from 2001-2010, parsimonious numerical models were created for each study site using selected significant predictors for lead times of 1-3 months as well half year averages. Preliminary investigation has shown that parsimonious statistical models can explain over 80% of the variance in monthly inflows with three month lead to the Toktogul reservoir, Kyrgyzstan (Dixon and Wilby, 2015). Such findings show promise for improving the safety and efficiency of reservoir operations as well as reducing risks emerging from climate change.