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Evaluation of Seasonal Streamflow Forecasts over South American Large Rivers

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Society's increasing demand for water and the need for its long-term management have motivated efforts toward improving seasonal streamflow forecasts. Currently, seasonal climate forecasts are routinely issued in meteorological centers around the world, generating information for decision-making and seasonal streamflow forecasting (SSF) studies that are becoming more frequent. Seasonal streamflow forecast skill derives from land surface initial conditions and atmospheric boundary conditions that mostly depend on large-scale climate phenomena (such as ENSO). Thus, seasonal rainfall predictions produced by dynamic climate models that represent ocean-atmosphere interactions may have a positive impact on streamflow forecasts. In South America, seasonal streamflow forecasts are essential for the hydropower sector, which is responsible for ~65% of the electric energy produced in countries such as Brazil. In this work, we assessed seasonal streamflow forecasts over South America based on a continental-scale application of a hydrologic-hydrodynamic model and precipitation forecasts from the ECMWF's fifth generation seasonal forecast system (SEAS5). Seasonal streamflow forecasts (SEAS5-SF) were evaluated against a reference model run and forecast skill was estimated relative to the Ensemble Streamflow Prediction (ESP) method. The bias correction of SEAS5 predicted precipitation improved the performance of the seasonal streamflow forecasts, frequently turning negative skill results into near null to positive skill. Results indicate that the ESP remains a hard-to-beat method for seasonal streamflow forecasting in South America. SEAS5-SF skill was found to be dependent on initialization month, season, basin and forecast lead time, with greater skill on the initialization month lead time. Rivers where the forecast skill is higher were Amazon, Araguaia, Tocantins and Paraná.

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