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An assessment of ensemble streamflow predictions in the semi-arid Andes Cordillera

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In the semi-arid extratropical Andes Cordillera, the seasonal snowpack acts as a natural water reservoir, releasing spring snowmelt runoff that accounts for more than 60 % of the total annual streamflow and sustains multiple productive uses, population needs, and unique ecosystems. Official seasonal streamflow forecasts (Sept-Mar runoff volumes) are currently generated by the General Water Directorate of Chile (DGA), based solely on regression-based methods that incorporate in-situ meteorological variables observed during winter as predictors. This work aims to assess the potential of the ensemble streamflow prediction (ESP) methodology for improved seasonal forecasts in high mountain basins in Central Chile, incorporating simple post-processing methods. To this end, we apply the GR4J rainfall-runoff model, as implemented in the airGR package, combined with the snow accumulation and ablation model CemaNeige in a set of case study basins. Preliminary results show that ESP forecast errors are smaller than those produced by the General Water Directorate of Chile (DGA). Ongoing efforts are aimed to identify potential differences and shortcomings in these techniques – using different verification measures – in terms of their capability to harness climatic and hydrologic sources of predictability.