Hydrological Seasonal Forecast as a Resource Assessment Tool for the Upper Adige Catchment

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Starting from 2004, the Office for Hydrology and Dams of the Autonomous Province of Bozen (Eastern Italian Alps) have been operating the Adige River Flood Forecasting System (ARFFS), a tool to predict and manage extreme floods in alpine snow-dominated catchments. Over the past decades and under the effects of climate change, snow droughts and water scarcity has proved to be an additional source of hydrological risk. As a result, ARFFS was recently upgraded to include climate seasonal forecasts for streamflow prediction to manage water availability up to two-month ahead, This upgrade is particularly critical to forecast the early spring and late summer periods, when the decreased amount of snowmelt and precipitation compels regional water reclamation authorities, stakeholders and communities to face the challenge of balancing the increasing demand of water resources with their decreasing availability. This work explores the potential of hydrological seasonal forecasting to help manage the balance between different water needs, in particular between upstream hydropower stakeholders and downstream agricultural users during the increasing number of heat waves and snow droughts in the region. The study focuses on extreme droughts events, such as the 2022 warm and dry period, assessing the hydrological balance of the alpine catchment and the connected agricultural areas. The forecasting system will implement different seasonal forecast products downscaled with CDFt bias adjustment techniques and test the performance of the new operational ARFFS framework to support effective decision strategies.