SESSION: (B4) S2D forecasts for decision making

(B4-04)

8-Month Snowpack Prediction Potential

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Western U.S. snowpack—snow that accumulates on the ground in the mountains—plays a critical role in regional hydroclimate and water supply with 80% of snowmelt runoff being used for agriculture. Utilizing observations, climate indices, and a suite of global climate models, we demonstrate the feasibility of seasonal snowpack predictions and quantify the limits of predictive skill 8 months in advance. This physically-based dynamic system outperforms observation-based statistical predictions made on 1 July for March snowpack everywhere except the Southern Sierra Nevada, a region where prediction skill is nonexistent for every predictor presently tested. Additionally, in the absence of externally forced negative trends in snowpack, narrow maritime mountain ranges with high hydroclimate variability pose a challenge for seasonal prediction in our present system; natural snowpack variability may inherently be unpredictable at this time scale. This work highlights present prediction system successes and provides a roadmap for testing future seasonal prediction systems to improve prediction skill. We find that a prediction system must be specifically designed for user needs (e.g. lead times, choice variables, events of interest), highlighting the need for engagement with stakeholders for future prediction system development.