



Why Does a Shift in Precipitation from Snow Towards Rain Lead to a Decrease in Long Term Mean River Flow?

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Empirical evidence suggests that a shift in precipitation from snow towards rain leads to a strong decrease in long term mean river flow, for a diverse set of snow-dominated catchments across the USA (Berghuijs et al, 2014, Nature Climate Change). Mutually inconsistent hypotheses have been proposed, but no comprehensive explanations are available to explain the observations. Why does less snow apparently lead to less river flow and more evaporation? Is it caused by changes in snow cover, soil freezing, infiltration processes, timing of plant water uptake or something else? Which processes are important where? Solving this scientific puzzle will have significant follow-on impacts for hydrological models, flood risk assessment, seasonal water forecasts, and climate change impacts on water availability, ecosystem functions and other systems impacted by long-term reductions in river flow and evaporation, and their feedbacks to the water cycle.

A large international research collaboration (CHIPPER, 35 groups from 15 countries) has formed to make a joint contribution to improved understanding of links between the phase of precipitation and the hydrological cycle, with a particular focus on water balance. This presentation will review progress since 2014 on the topic, outline intended future lines of investigation, and invite feedback and additional collaborations.