SESSION: (A4) S2S forecasts for decision making

(A4-08)

Using hydrologic prediction skill elasticity to quantify the benefits of s2s climate information for hydrologic forecasting

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Water resources decision-making commonly relies on monthly to seasonal streamflow forecasts among other kinds of information. The skill of such predictions derives from the ability to estimate a watershed's initial moisture and energy conditions and to forecast future weather and climate. A recent project sponsored by the US water agencies (the US Army Corps of Engineers and the Bureau of Reclamation) investigated the role of each source of predictability at S2S time scales to assess where and when improvements in each area can improve streamflow forecasts for use in water management. The study used hydrologic simulation models for 424 US watersheds in an idealized predictability framework to characterize the influence of varying levels of skill in each predictability area on streamflow prediction skill. It enabled the calculation of derivatives in hydrologic predictability (ie, skill elasticities) throughout the initial conditions and future forcing skill space. We find that regional and seasonal variations in watershed hydro-climatology strongly control the relative importance of initial hydrologic conditions and S2S climate forecasts, leading to striking differences between rainfall driven and snowmelt driven watersheds. The resulting analysis provides insights on the relative benefits of investments toward improving watershed monitoring (through modeling and measurement) versus improved climate forecasting and application. A somewhat counterintuitive but encouraging finding was that climate forecast skill improvements can be amplified in streamflow prediction skill, which means that climate forecasts may have greater benefit for S2S flow forecasting than may be expected from climate forecast skill alone.