



Quantifying the hydrologic effect of climate variability in the lower Colorado

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Regional climate patterns are driven in large part by ocean states and associated atmospheric circulations, but modified through feedbacks from land surface conditions. The latter defines the climate elasticity of a river basin. Many regions that lie between semi-arid and semi-humid zones with seasonal rainfall, for instance, experience prolonged periods of wet and dry spells. Understanding the triggers that bring a river basin from one state (e.g. wet period of late 90s in the Colorado basin) abruptly to another state (multi-year drought initiated in 2001 to present) is what motivates the present study. Our research methodology investigates the causes of regional climate variability and its effect on hydrologic response. By correlating, using different monthly time lags, sea surface temperatures (SST) and sea level pressures (SLP) with basin averaged precipitation and surface temperature we determine the most influential regions of the Pacific Ocean on lower Colorado climate variability. Using the most correlated data for each month, we derive precipitation and temperature distributions under similar conditions to that of the El Nino Southern Oscillation (ENSO). We compare the distributions of the climatic data, given ENSO constraints on SST and SLP, to the distributions considering non-ENSO years. Finally we use observed stream flows and climatic data to determine the basin's climate elasticity. This allows us to quantitatively translate the predicted regional climate effects of ENSO on hydrologic response. Our presentation will use data for the Little Colorado as an example to demonstrate the procedure.