

Effects of Anthropogenic Activities on Climate Cycle Patterns in Temperature and Precipitation over the 20th Century in the Gunnison River Basin

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Abstract. Increasing variability in the hydrologic/climate system is cited as a major cause in decreasing accuracy and lead time for water supply forecasts in the Colorado River Basin. Sources of variability include climate cycles, climate change, modifications in land use, land cover and water use (hereafter referred to as land use), and interannual variations in climate. This study strives to understand the underpinnings of the variability by applying quartile analysis and linear regression to determine climate cycle-related patterns in temperature and precipitation, and associated seasonal complementary temperature/precipitation patterns; as well as to determine effects of climate change and modifications in land use on climate cycles and related seasonal complementary patterns. The methods are applied to temperature, precipitation and streamflow data for Sept-Mar between 1910 and 2005 for the Gunnison River, a tributary of the Colorado River. Quartile analysis results reveal cyclic patterns in monthly and seasonal temperature and precipitation related to prevailing climate cycles, as well as directional influences of 20th century changes in climate and land use. The changes include increasing temperatures and earlier shifts in timing of precipitation between fall and early spring. The second presentation summarizes results of linear regression analysis. Results of both analyses may be used to improve accuracy and lead time in water supply forecasting, and improve water resource management.

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