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Linking GCM driven hydrology simulations to paleo-hydrology in mountain watersheds

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Ongoing hydrology and paleoclimate research programs are creating 600 year (1500 to 2100 A.D.) records of the hydroclimate for two important watersheds in western Canada. The generated databases will allow water managers and basin stakeholders to better prepare for the impacts of climate change on water supplies. The major risk for both watersheds in Canada's western interior is a change in the availability of water resources, including the timing of supplies and distribution among basins. The St. Mary watershed in Glacier National Park Montana provides water for a 200,000 ha irrigation development in southern Alberta, Canada. The North Saskatchewan Watershed headwaters lie in the Rocky Mountains of Alberta, and is the source of water for major urban centres with total populations approaching two million people. This project applies two hydrometeorological models simulating daily meteorology variables and associated hydrologic response at high spatial resolution over the watersheds. A range of GCM based future climate scenarios are evaluated with the hydrometeorological models to create a hydrology time series from 1960-2100. This output is linked to paleo-hydrology work using an extensive dendrochronology database that has defined seasonal hydrology for western Canadian regions for the last 500 years. We provide a 600 year hydrology time series that will allow partners and stakeholders a better understanding of forecast climate driven hydrological variability in context with an extensive historical hydrology database.