

CUAHSI 2016 Biennial Symposium “*Finding Your Place in Big Data: Using Observations to Understand Hydrologic Processes for Predicting a Changing World*”

Symposium theme(s): Large-scale Data Mining and Synthesis & General Water Science

Characterization of Wyoming snow-water equivalent variability based on historical SNOTEL data

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The NRCS automated snowpack monitoring network (SNOTEL) encompasses 730 stations located in remote high elevation watersheds in the 11 Western states, providing open-access historical data (~30 years) and near-real time observations. The primary purpose of this monitoring is to deliver data for forecasting of water supplies in the West, where snowmelt is a dominating and crucial surface water source. When it comes to data volume, SNOTEL data can be considered the “younger sister” of Big Data, in that the overall volume of the data are not terrascale but the data exploration and analysis are challenging due to its scope. Issues relating to the use of historical time series data such as SNOTEL, including the variety, variability, and veracity of the data lead to issues in accurately managing the data with a high velocity, especially in the areas of exploratory mining and pattern recognition.

Our research focuses on characterizing the variability of several snow-water equivalent (SWE) derived parameters (e.g. : annual peak SWE accumulation, April 1st SWE, timing of peak SWE, period of snowmelt, rate of snowmelt, timing of snow disappearance) and identifying patterns in their temporal and spatial variability. The study exploits historical daily data from 70 SNOTEL stations located throughout Wyoming for 1978-2015.

We describe temporal and spatial variability in snowpack signals with the purpose of providing information that will improve the understanding of hydrologic response and streamflow response to snowpack dynamics. Regional heterogeneities and their importance for water management within the headwater state of Wyoming and downstream will be discussed. Special attention will be placed on the specific challenges and limitations of using this historical dataset for understanding the past and present snowpack and snowmelt variability and potential change due to climatic forcing and/or vegetation disturbances.