Examining trends in streamflow in the Southern Rocky Mountains

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Abstract. Semi-arid and arid regions, like Colorado and the western U. S., that receive little precipitation during the summer are particularly dependent on storage and reservoirs. Seasonal snowmelt supplies a majority of water for these areas and the timing of the onset of snowmelt into streams is crucial for estimating water availability. We examined streamflow trends in high elevation watersheds in the Southern Rocky Mountains of Colorado and identified the start and end of spring snowmelt using daily discharge data. Data from the USGS gauging stations were used over a 40-year period (1976-2015), and basins ranged in size from 4 km^2 to 550 km^2. Stations used had at least 30 years of data and were at an elevation higher than 1800 meters above sea level. For each station-year, a cumulative discharge graph was created and the second derivative of the graph was calculated for each day. On the day when the second derivative was greater than a given threshold value was deemed to be the start of snowmelt contribution. The end of snowmelt was determined when the average slope of the cumulative discharge dropped below 10 millimeters. Trends in streamflow were computed for the start, end, and total duration to assess potential changes in climate. Preliminary results suggest that the duration of snowmelt contribution to streamflow has decreased.