Nonparametric Daily Disaggregation of Annual Streamflow Values

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Abstract. Streamflow disaggregation techniques are used to distribute a single value to multiple sites in both space and time while preserving distributional statistics from observed data. A number of techniques exist for accomplishing this task through a variety of parametric and nonparametric approaches. However, most of these methods struggle in the time domain for resolutions finer than the monthly scale. This is generally due to common issues faced when attempting to obtain daily streamflow data; [1] as the number of variables in space and time increases, computational intensity quickly becomes taxing in an effort to preserve space-time relationships and; [2] methods using a step-wise approach (i.e. annual to monthly to weekly to daily) may not produce realistic flow continuity. This work extends a proven method for multi-site, annual to monthly disaggregation to directly produce daily data from annual flow values via a K-NN resampling coupled with data scaling based on annual flow magnitudes. The procedure is simple, data driven and captures observed statistics quite well. Furthermore, the generated daily data are continuous and display lag correlation structure consistent with that of the observed data. To demonstrate the utility and effectiveness of this approach, it is used to generate daily flows for sites on the San Juan River, which are then compared with results from earlier daily disaggregation work at the same locations.