**Introduction**

Since moving to Boston in 2018, each summer feels drier and each winter seems to bring less snow. The drought maps of Massachusetts I see on summertime local news remind me of the omnipresent fire risk signs I grew up around in the drought-prone interior Pacific Northwest; watching the trees at my local park turn brown churns the same worry in my gut as watching High Desert junipers become more like tinder than timber as the dry season progresses. Access to water immediately affects the ability of an area to support life and increases the cost and risk of enterprise there.

Precipitation is a major component of climate, along with temperature, wind speed, atmospheric pressure, and solar radiation, etc. (Fick and Hijman, 2017). However, not all climate variables affect us as noticeably; precipitation in any form- rain, snow, or hail- requires immediate personal attention and, at times, community action to prevent larger effects. Understanding this key component of the water cycle impacts in our ability to prepare as persons and communities for regular and extreme weather events.  
  
Here, I investigate precipitation patterns in the Boston area and predict future monthly precipitation into June 2023. After investigating patterns of seasonality and autocorrelation, I use LightGBM’s regressor model to characterize precipitation as a function of time.

**Methods**

Dataset – The 'Precipitation Database Data 2019' dataset is available from the Massachusetts Department of Conservation & Recreation's Office of Water Resources (<https://www.mass.gov/info-details/precipitation-data>). This dataset is comprised of observed monthly precipitation totals (in inches) for weather stations across Massachusetts. It can be difficult to compare snowfall to rainfall given that water content in snow is variable (consider 'powdery’ snow and snowball-packing snow). Here, snowfall is melted into equivalent inches of water and summed with any rainfall.

<font size="1.2"> The basin names correspond to the 27 drainage basins defined by the USGS Water Resources Divison and the MA Water Resources Commission (https://www.mass.gov/info-details/massgis-data-major-drainage-basins). The only difference is that the Conchord basin is now called SuAsCo (Sudbury-Assabet-Concord). Additional information regarding this dataset archived elsewhere may clarify what a Region Composite Station means in terms of data collection. The regions correspond to the drought regions (https://www.mass.gov/service-details/drought-regions) except for the Cape Cod and Islands regions, which have been combined. </font>

Station Selection – I selected stations with records a) greater than 30 years long that b) ended in 2019, the year of dataset publication. This resulted in

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