

## Seattle Weather Project:

### Problem:

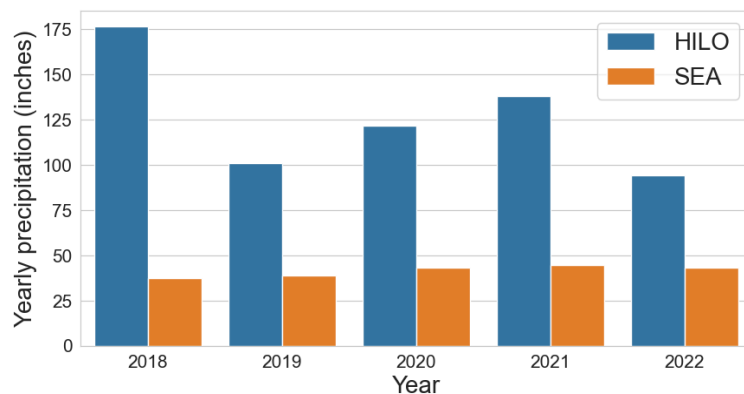
We were informed that the professor's parents object to how much they perceive it rains in Seattle compared to their hometown of St.Louis, MO. We were instructed to choose a different city to compare to Seattle, as long as we had reason to believe the other city would also have significant rainfall.

### Analysis:

In order to form some quantitative basis for addressing the question of which is rainier, we decided to use atmospheric data from National Centers for Environmental Information (NOAA Climate Data) for the cities of Seattle, WA and Hilo, HI from January 1st, 2018, to December 31st, 2022. The datasets provided more information than was relevant so they were pruned to columns of interest: station, date, and precipitation. Once the data was simplified I chose to average across the same day from each year, on the assumption that weather patterns are generally the same across years for different seasons. This was mostly motivated by the missing data in Seattle where there is a large gap of missing days in January and February of 2018 so averaging within the month from that year would be futile.

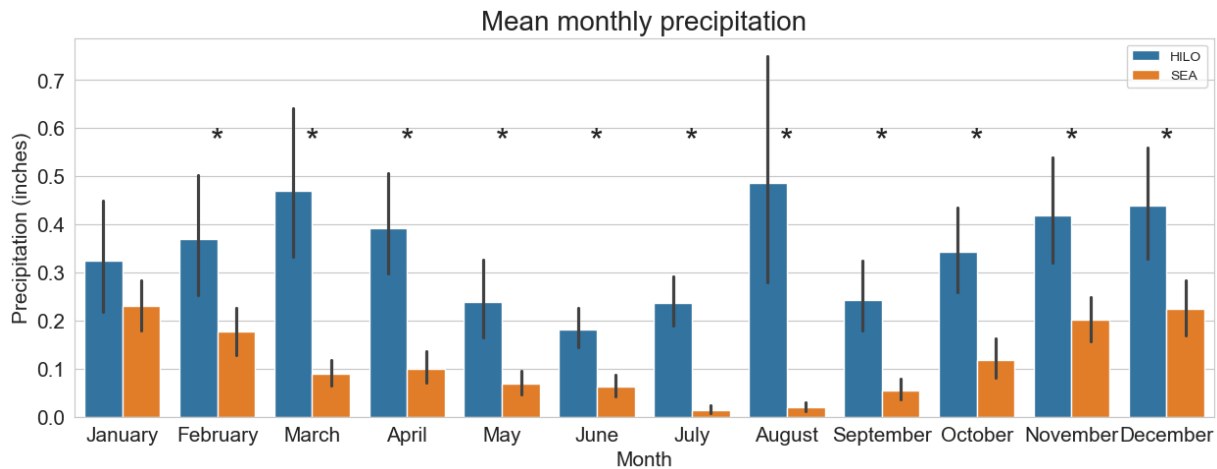
With the clean data we are able to start asking, and answering questions about precipitation across the cities. The questions I proposed were: what is the maximum amount of rain on any one given day? Which city has the overall greater volume of rainfall in a given timeframe (monthly and yearly)? Which city has the higher average amount of rain in a given timeframe (monthly, yearly)? And which city has fewer days of 0 rain?

The most amount of rain in one day in Hilo? 15 inches. Seattle had a daily maximum of 2.6. Next I looked at the total volume of rain in a year. Maybe Hilo had downpours with less days of rain, but Seattle would overtake Hilo with a slow and steady deluge. However even Hilo's least rainy year had twice the rainfall of Seattle's rainiest year (Hilo with 94 on a slow year in 2022 and Seattle with 44 on its wettest year of 2021).



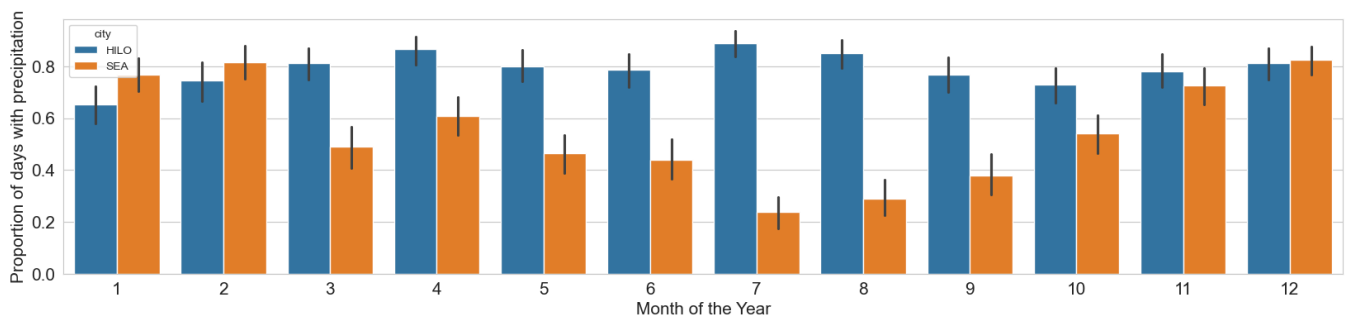
*Fig.1* : Bar plot displaying yearly total precipitation for Hilo and Seattle from 2018-2022

A t-test, a method to determine statistical significance, of the monthly average rain also concludes that in every month except January, Hilo receives significantly more rain than Seattle.



*Fig.2* : Bar plot displaying mean monthly precipitation of Hilo and Seattle, with statistically different averages indicated by (\*) symbols.

This made me curious about how many days had zero recorded rainfall. We had replaced missing values in Seattle so this might not be the most accurate representation for Seattle, but if anything it should skew results higher for Seattle. Seattle seems to experience seasonal dips in rain with less rain from March to September when the proportion of days with rain dips below 50%. In contrast, Hilo always rains 60% or more of the days of the month throughout the year.



*Fig. 3:* Bar plot displaying percentage of days each month that Hilo and Seattle experienced precipitation.

### Conclusion:

Hilo is rainy! I would recommend the professor's parents **not** move to Hilo if they are concerned about potential precipitation since on every axis we examined Hilo far exceeds Seattle in rain-iness.