# TEMPERATURE CHANGE IN URBAN AREAS AND NON-URBAN AREAS

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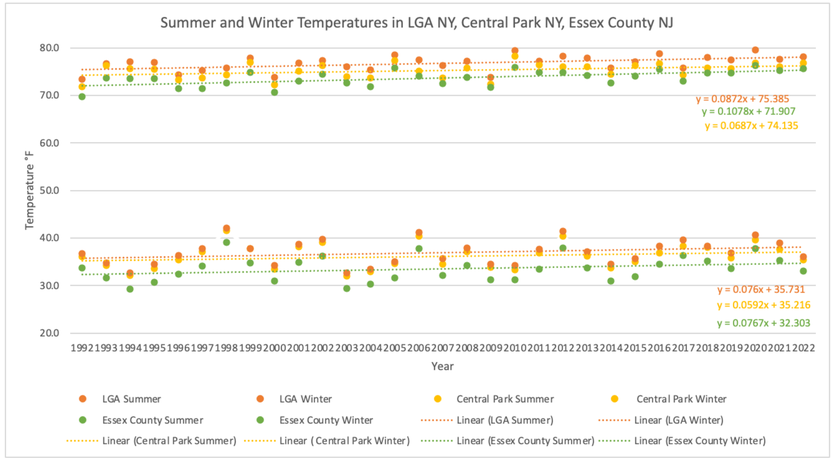
## RESEARCH QUESTION:

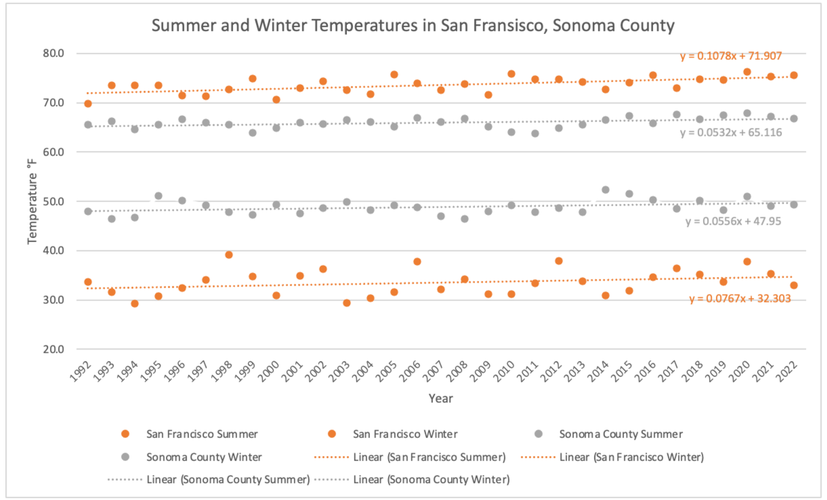
How will average winter and summer temperatures vary between urban and non urban areas?

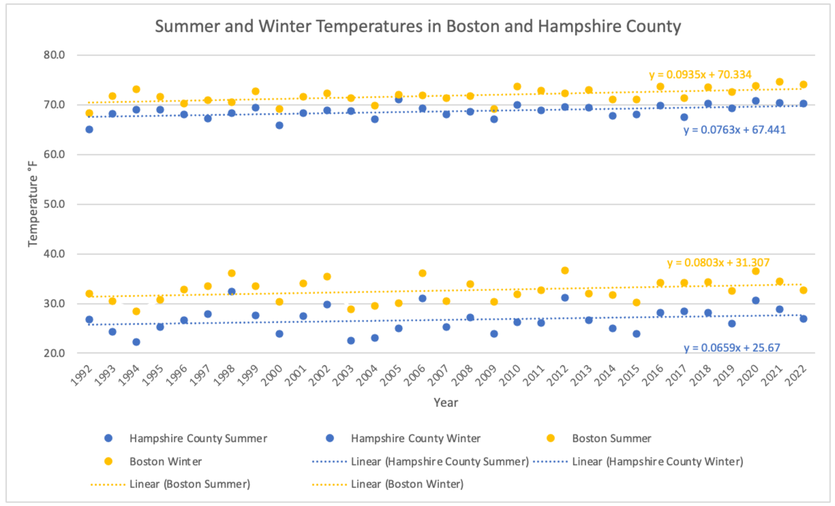
## METHODOLGY

- Using the data from the National Centers for Environmental Education, taken from the City Times Series.
- Selected densely populated urban cities and corresponding rural areas along similar latitudes
- Gathered the necessary temperature data for the summer and winter seasons in the years 1992-2022 and sorted on Excel

## RESULTS




## Statistical Testing:

t-Test: Paired Two Sample for Means
winter

| | *Urban* | *Less Urban* |
|---|---|---|
| Mean | 0.077666667 | 0.066066667 |
| Variance | 5.32333E-06 | 0.000111323 |
| Observations | 3 | 3 |
| Pearson Correlation | -0.165204221 | |
| Hypothesized Mean Difference | 0 | |
| df | 2 | |
| t Stat | 1.799296786 | |
| P(T<=t) one-tail | 0.106891822 | |
| t Critical one-tail | 2.91998558 | |
| P(T<=t) two-tail | 0.213783644 | |
| t Critical two-tail | 4.30265273 | |

t-Test: Paired Two Sample for Means
summer

| | *Urban* | *Less Urban* |
|---|---|---|
| Mean | 0.096167 | 0.0791 |
| Variance | 0.000111 | 0.000751 |
| Observations | 3 | 3 |
| Pearson Correlation | -0.952591 | |
| Hypothesized Mean Difference | 0 | |
| df | 2 | |
| t Stat | 0.786175 | |
| P(T<=t) one-tail | 0.25706 | |
| t Critical one-tail | 2.919986 | |
| P(T<=t) two-tail | 0.51412 | |
| t Critical two-tail | 4.302653 | |

## LITERATURE REVIEW

- Researchers found an urban heat island (UHI) effect in NYC but no park cooling effect (Gaffin et al., 2008)
- Different street landscapes in NYC had different nighttime temperatures (Shaker et al., 2019)
- There are 3 major models for studying UHI, of which city-scale models are most useful for our research (Mirzaei, 2015)

## CONCLUSIONS

- Regarding rates of change, there was not enough evidence for us to say that urban areas have higher rates of change; the small sample sizes limits our progress here. Further research with bigger sample size could change this conclusion.
- Regarding temperatures, it's clear that urban areas and non-urban areas have different temperatures. The t-test for Massachusetts data proves this.
- There is a statistically significant difference between Central Park and LGA temperatures even though they follow a similar pattern and are very similar during the winter time
- Limitations: could not find data for exact locations we wanted; difficulty pinpointing exact locations ex: Essex County.

## REFERENCES

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