



# Measuring The Economic Impact of an Isolated Natural Disaster

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## **Problem**

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How can we measure the economic impact of a disaster  
in terms of wages and unemployment?

## **Plan**

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- Perform a case study on Hurricane Sandy
  - Break down into relevant localities
    - Investigate and evaluate economic metrics:
      - Wages
        - Break down by industry
      - Unemployment



## **Hypotheses**

What do we expect to  
find?

1

2

3

4



## **Hypothesis 1:**

The occurrence of a natural disaster will lead to a pronounced loss of wages and increase in unemployment.

## **Hypothesis 2:**

**The occurrence of a natural disaster will negatively affect wages in tourism industries.**



### **Hypothesis 3:**

The occurrence of a natural disaster will not significantly affect wages in professional industries.

Professional business services  
Financial services  
Information services



## **Hypothesis 4:**

The relative intensity of a disaster in a given locality will be correlated to any negative impact on wages and unemployment.



# Data

## Natural Disaster Indicators

- Quantifying Storm Intensity
  - Barometric pressure
  - Precipitation
  - Wind speed

## Economic Impact Indicators

- Wage Data
  - Wages per city for each private industry
  - Monthly
- Unemployment
  - Monthly

## Weather Data Related Shortcomings

- NOAA barometric pressure data had many months worth of data missing
- NOAA tide levels did not have constant readings per day
- Not all on a consistent scale

## Economic Data Related Shortcomings

- Wage and Unemployment data were only gathered per month which limits how useful the weather data is
- Wage data had many missing values
- Only analyzed private industry data
- Wage is not the best at measuring sudden changes in conditions



## Data Gathering

- Weather data
  - NOAA
- Wage data
  - BLS
- Unemployment data
  - Federal Reserve Board

## Economic Data



# FEMA



## Disaster Data



# Economic Impact Indicators

## Wage Data

- Wages per city for each private industry
- Monthly

## Unemployment

- Monthly



# Natural Disaster Indicators

## Quantifying Storm Intensity

- Barometric pressure
- Precipitation
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## Weather data

- NOAA

## Wage data

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## Unemployment data

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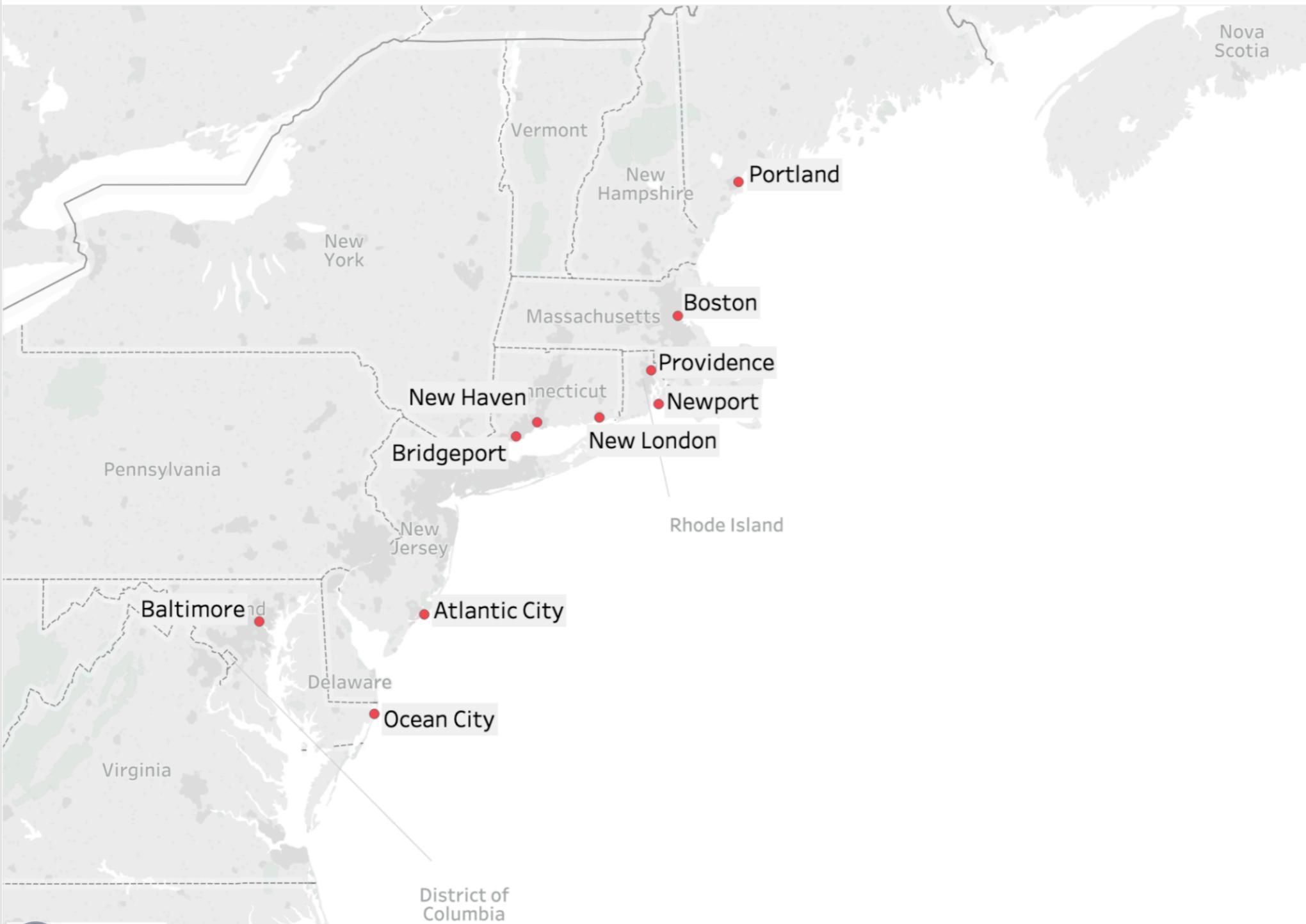


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## Localities for Analysis





## **Exploration**

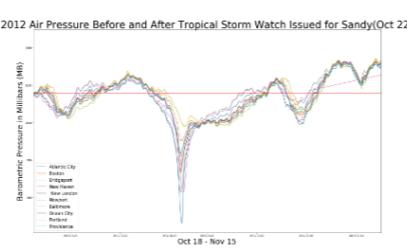
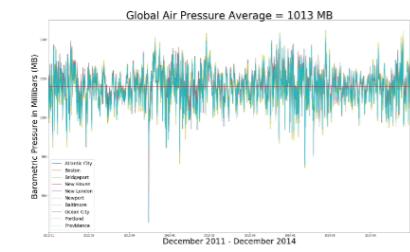
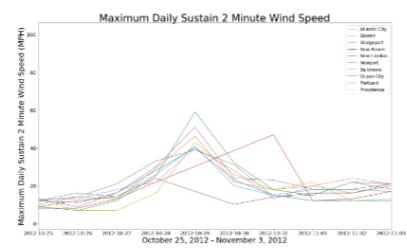
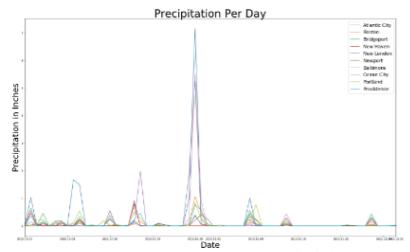
Economic Metrics

Weather Metrics

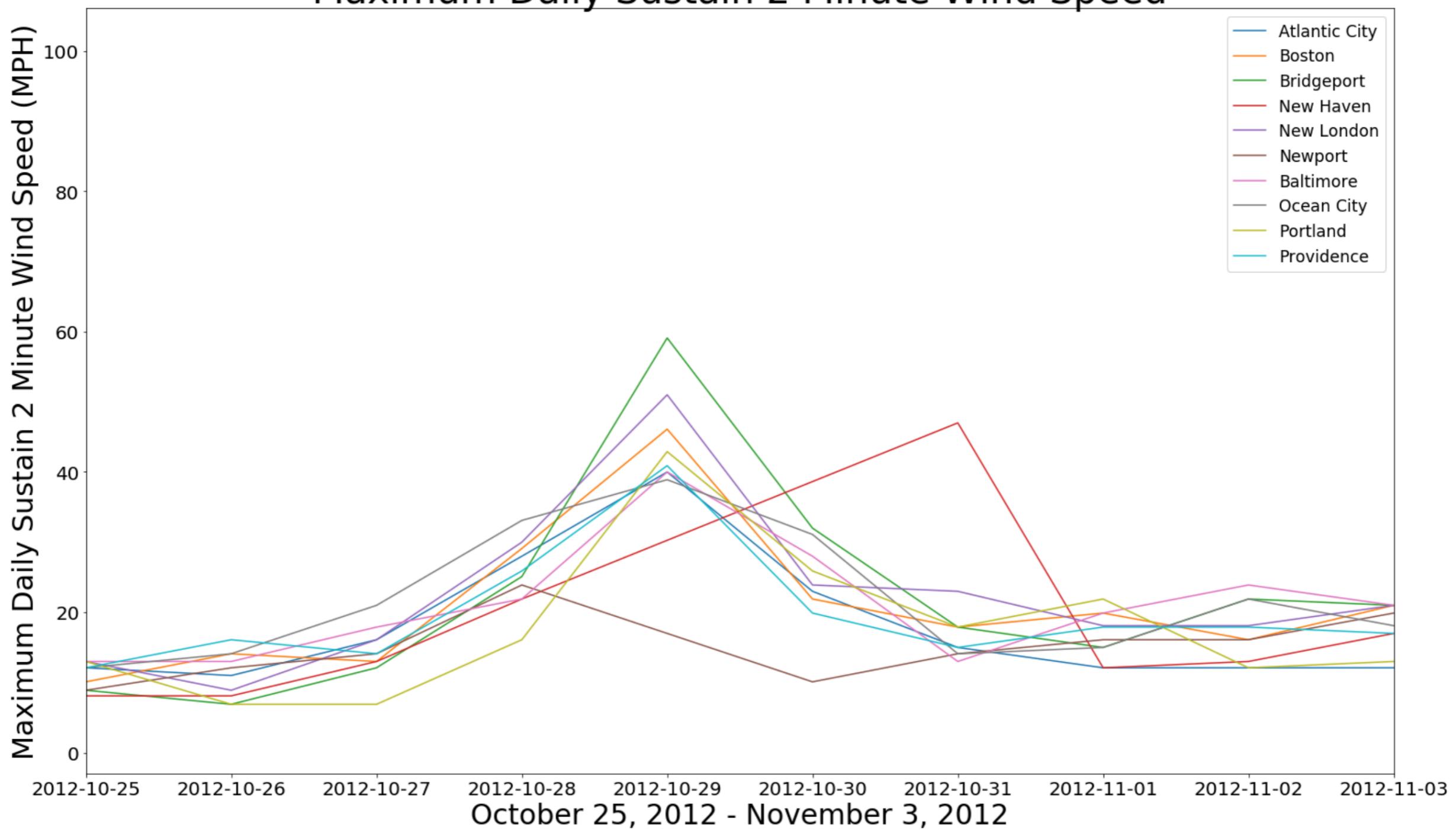
Weather  
Analysis

Economic  
Analysis

# Weather Data



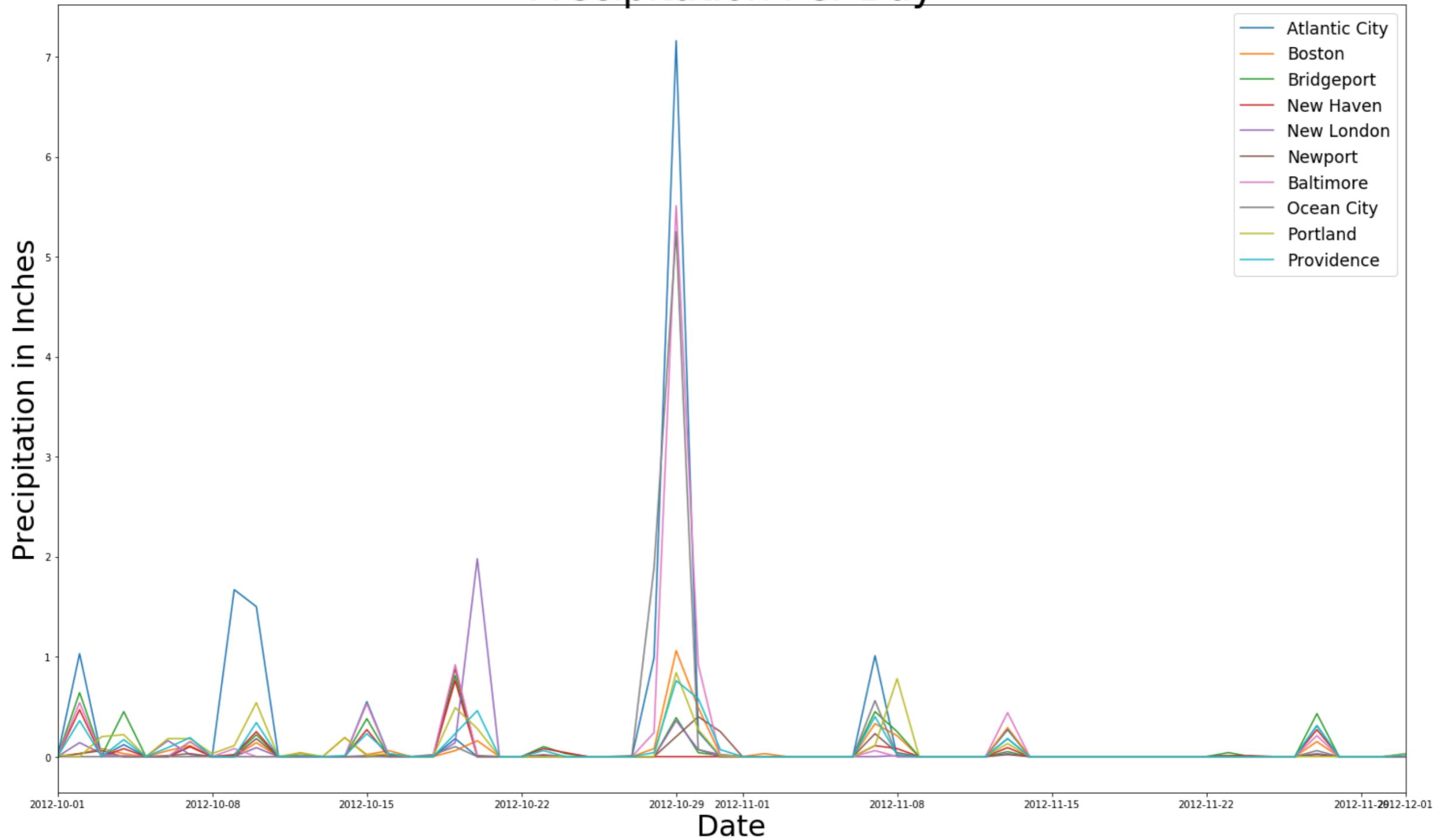
## Maximum Daily Sustain 2 Minute Wind Speed



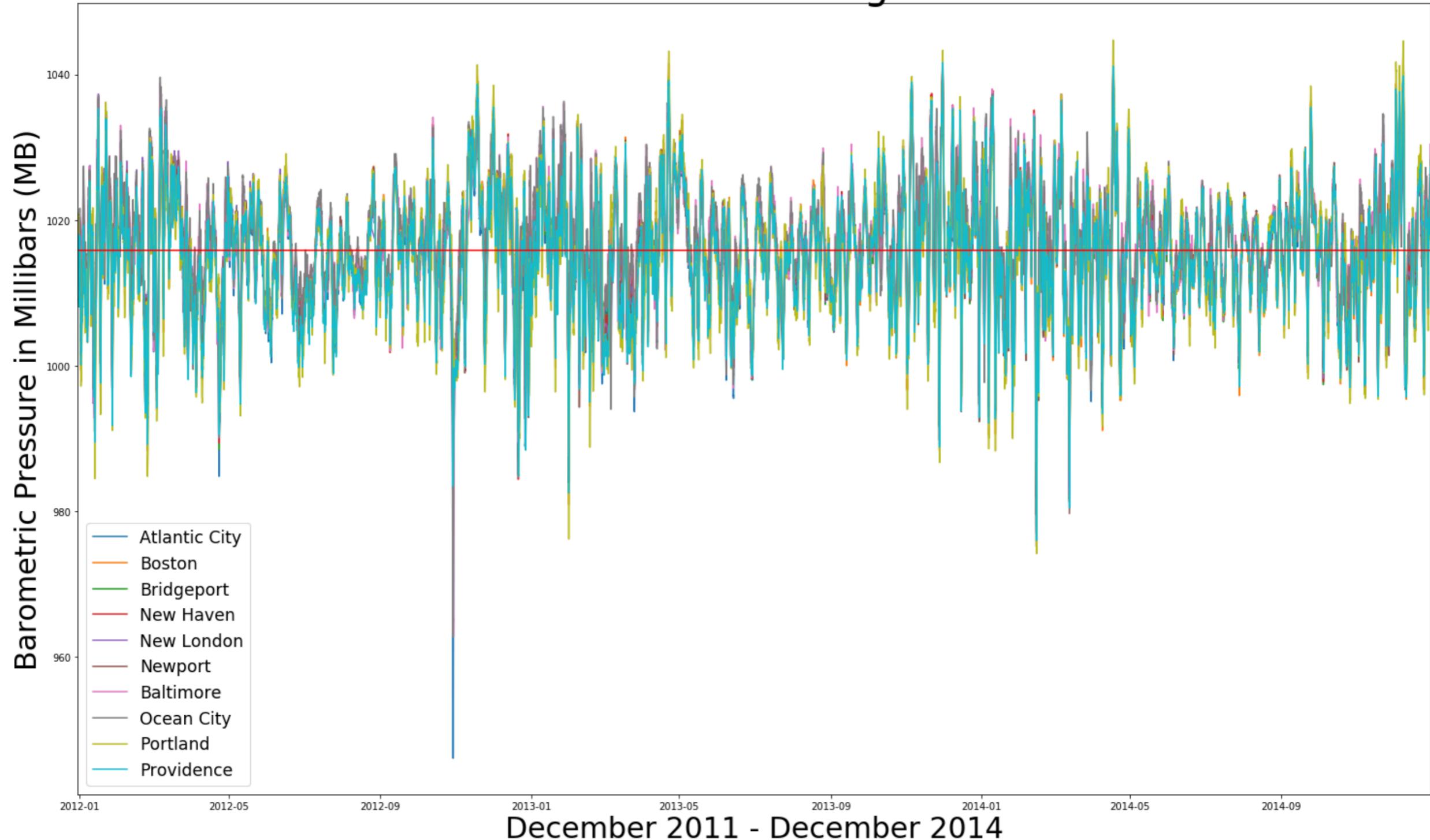
October 25, 2012 - November 3, 2012



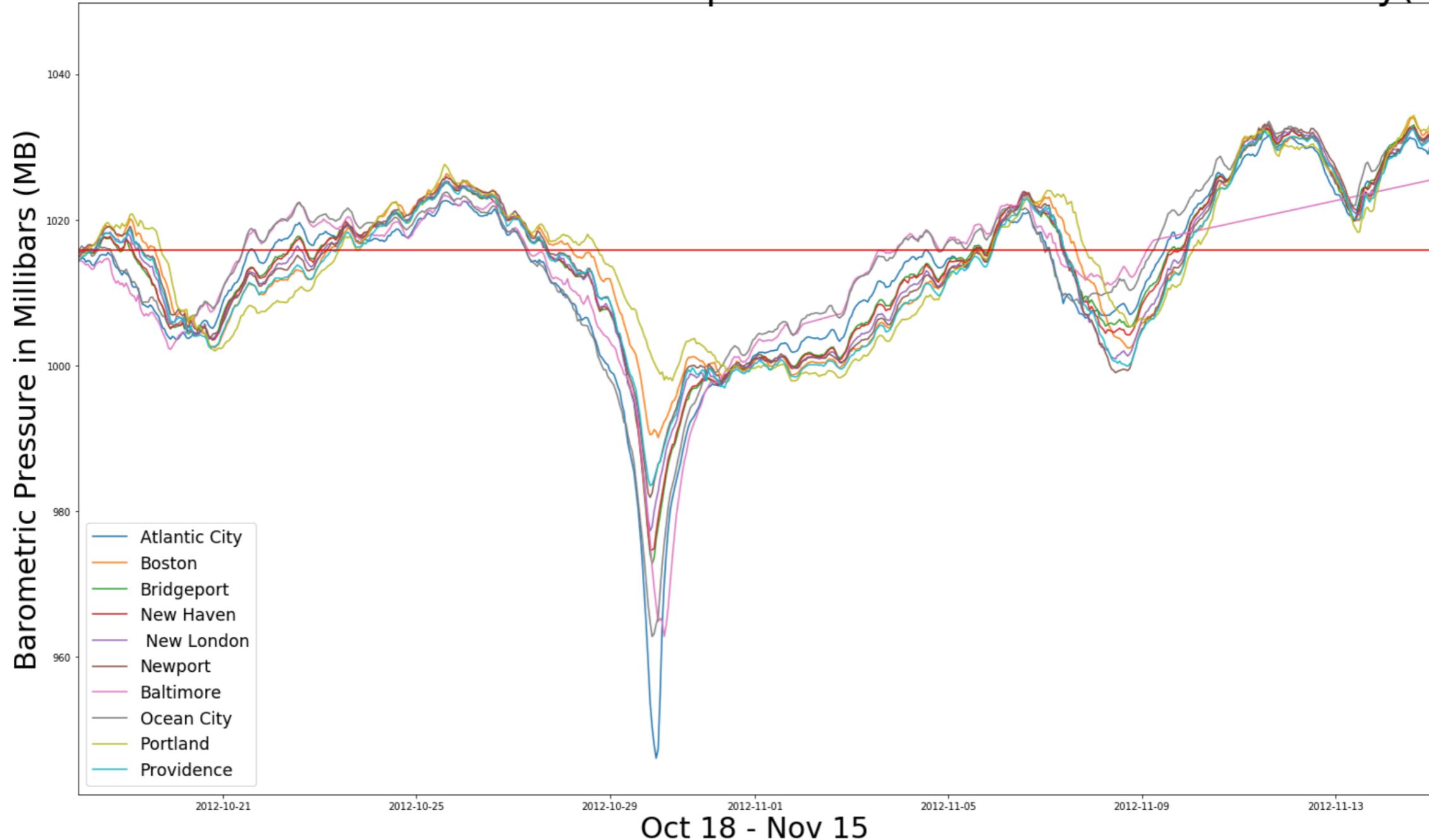
## Precipitation Per Day

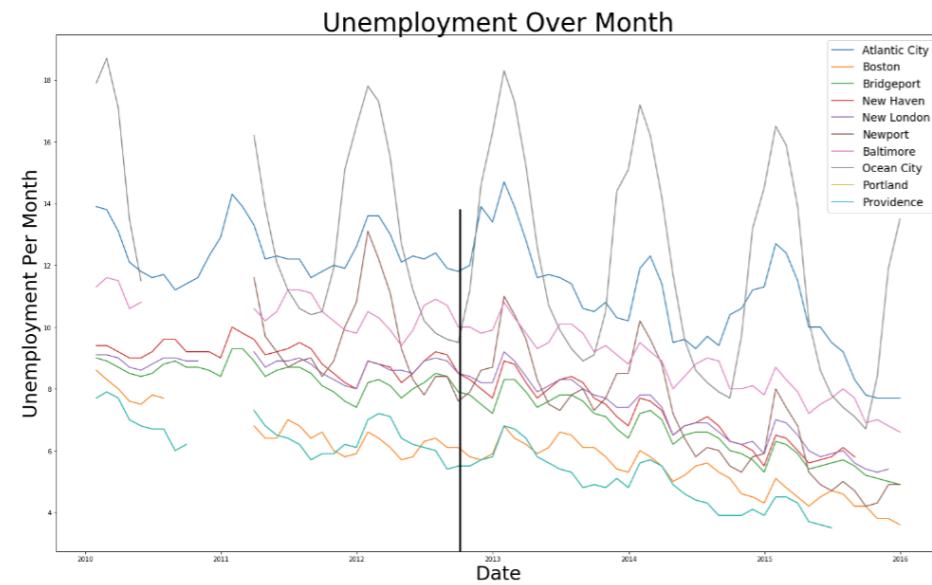
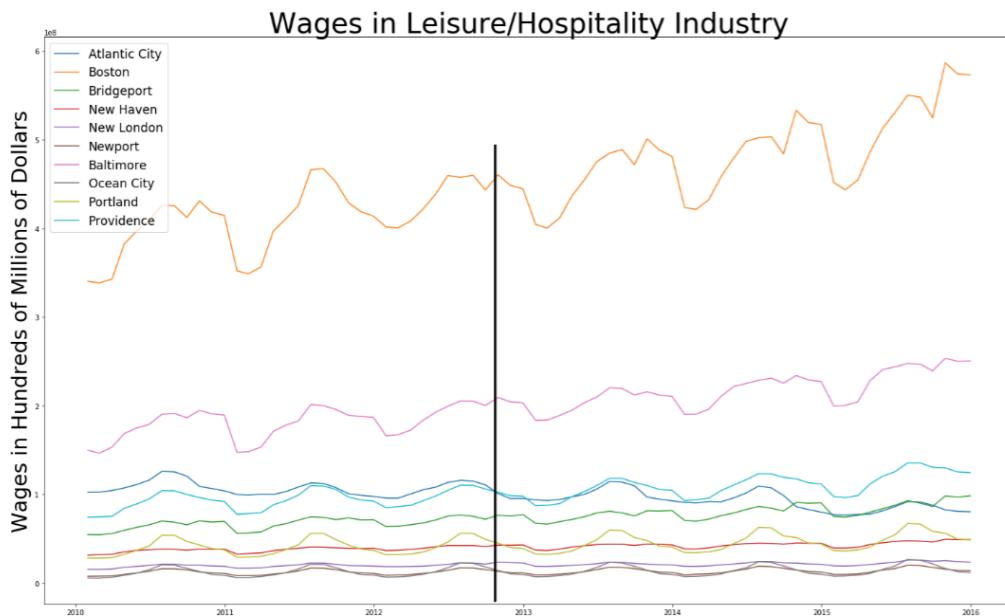


## Global Air Pressure Average = 1013 MB



## 2012 Air Pressure Before and After Tropical Storm Watch Issued for Sandy (Oct 22)



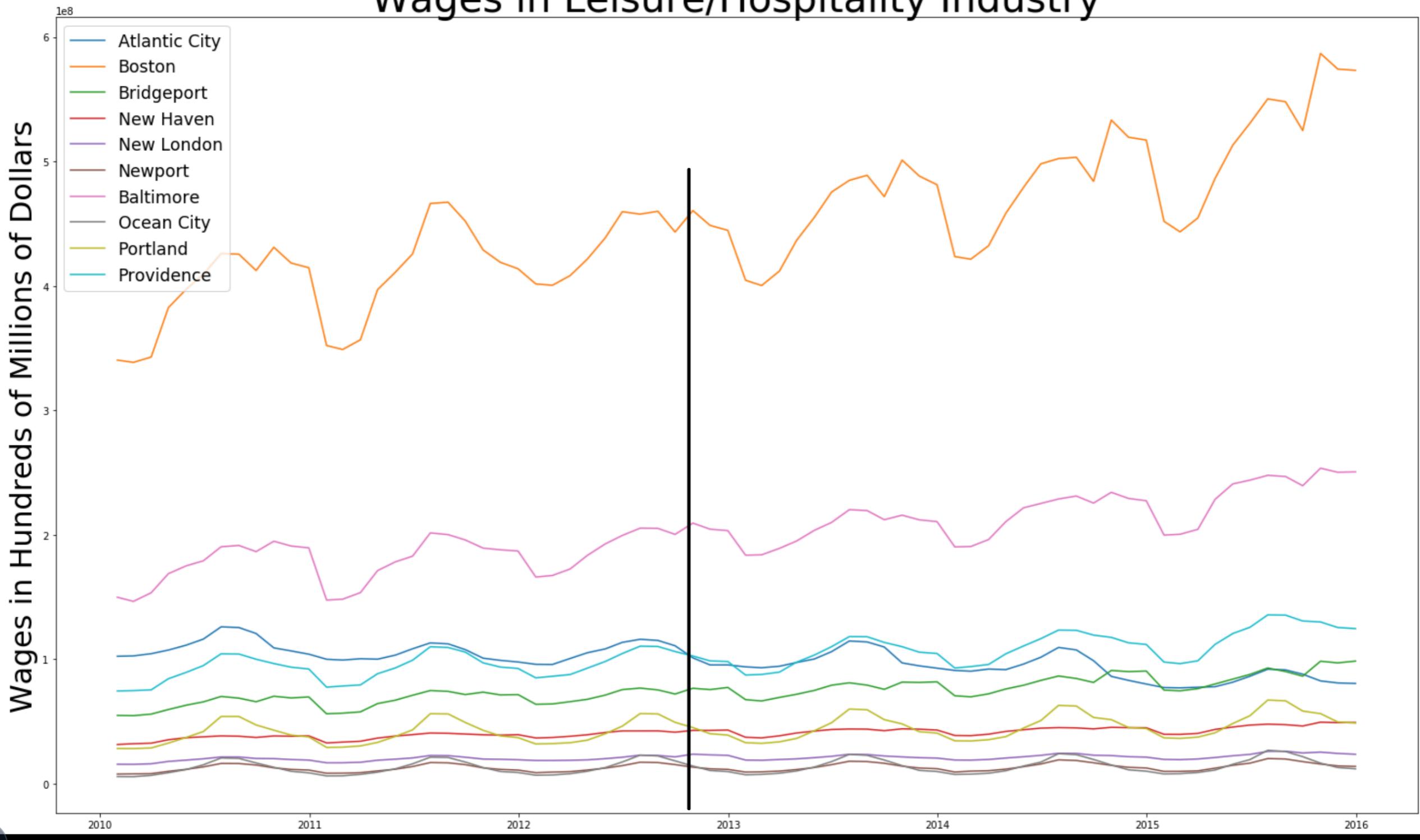


# Economic Data

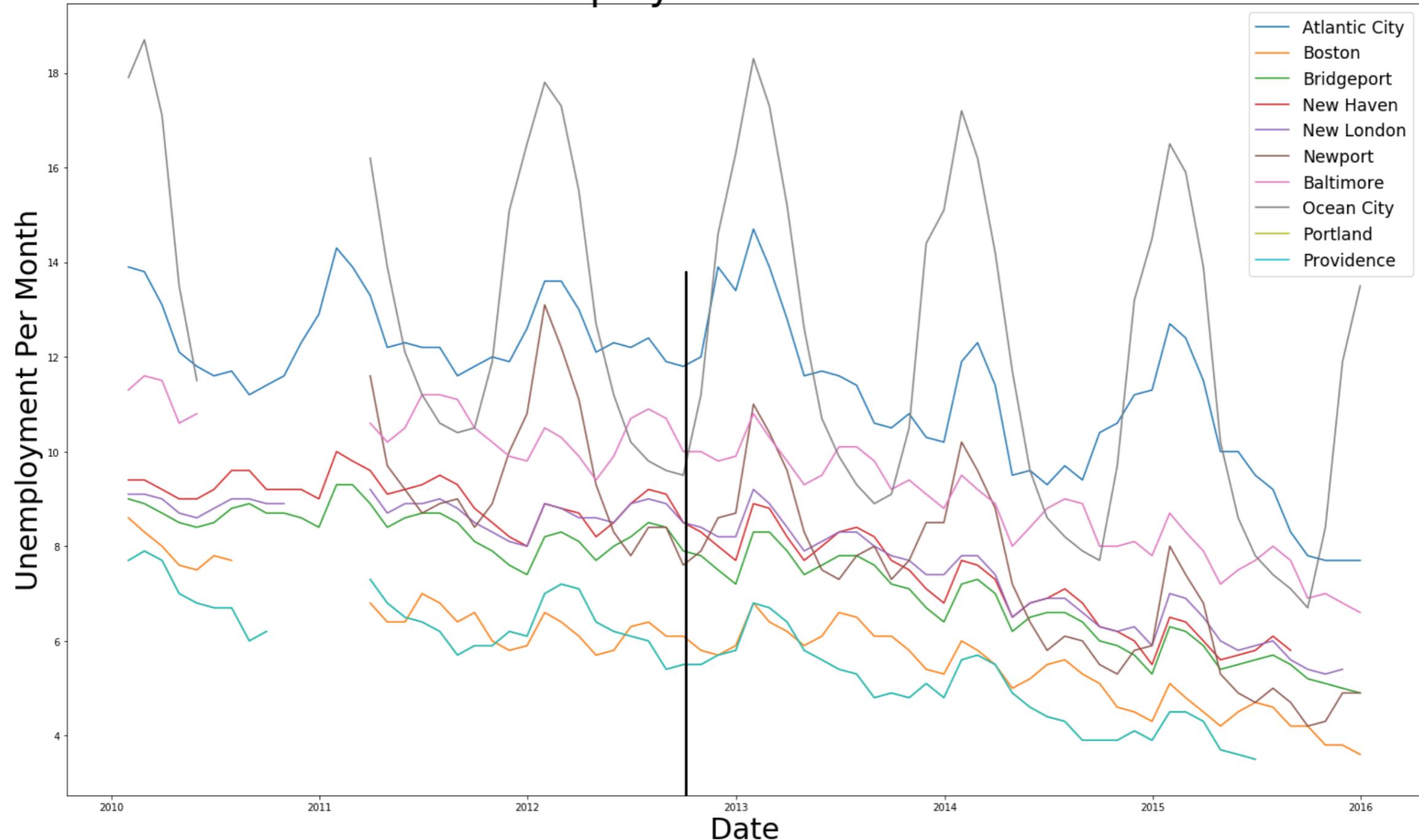
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# Wages in Leisure/Hospitality Industry



## Unemployment Over Month





## **Modeling**

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- What was our strategy for analysis?

Methodology

Results

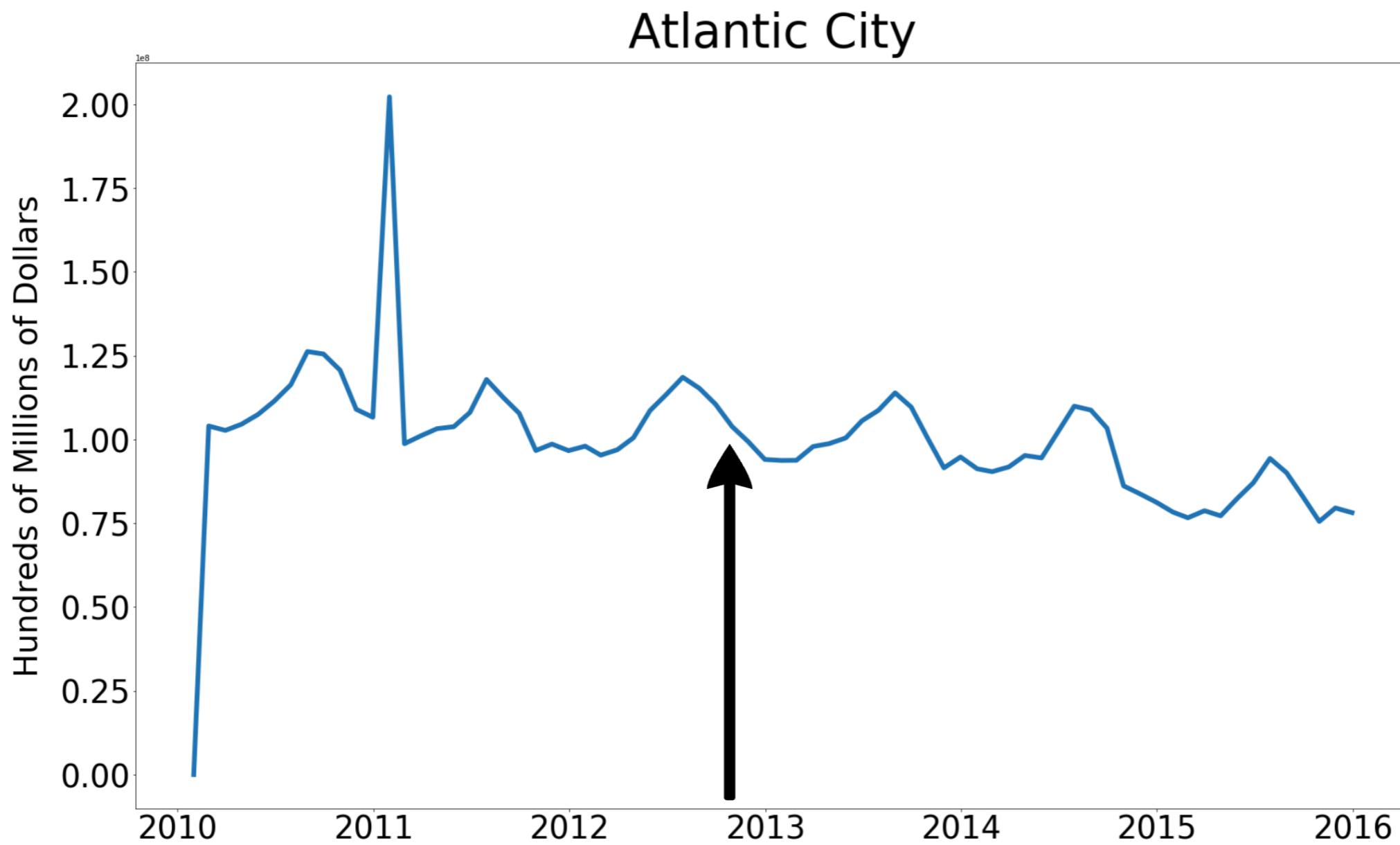


## **Strategy**

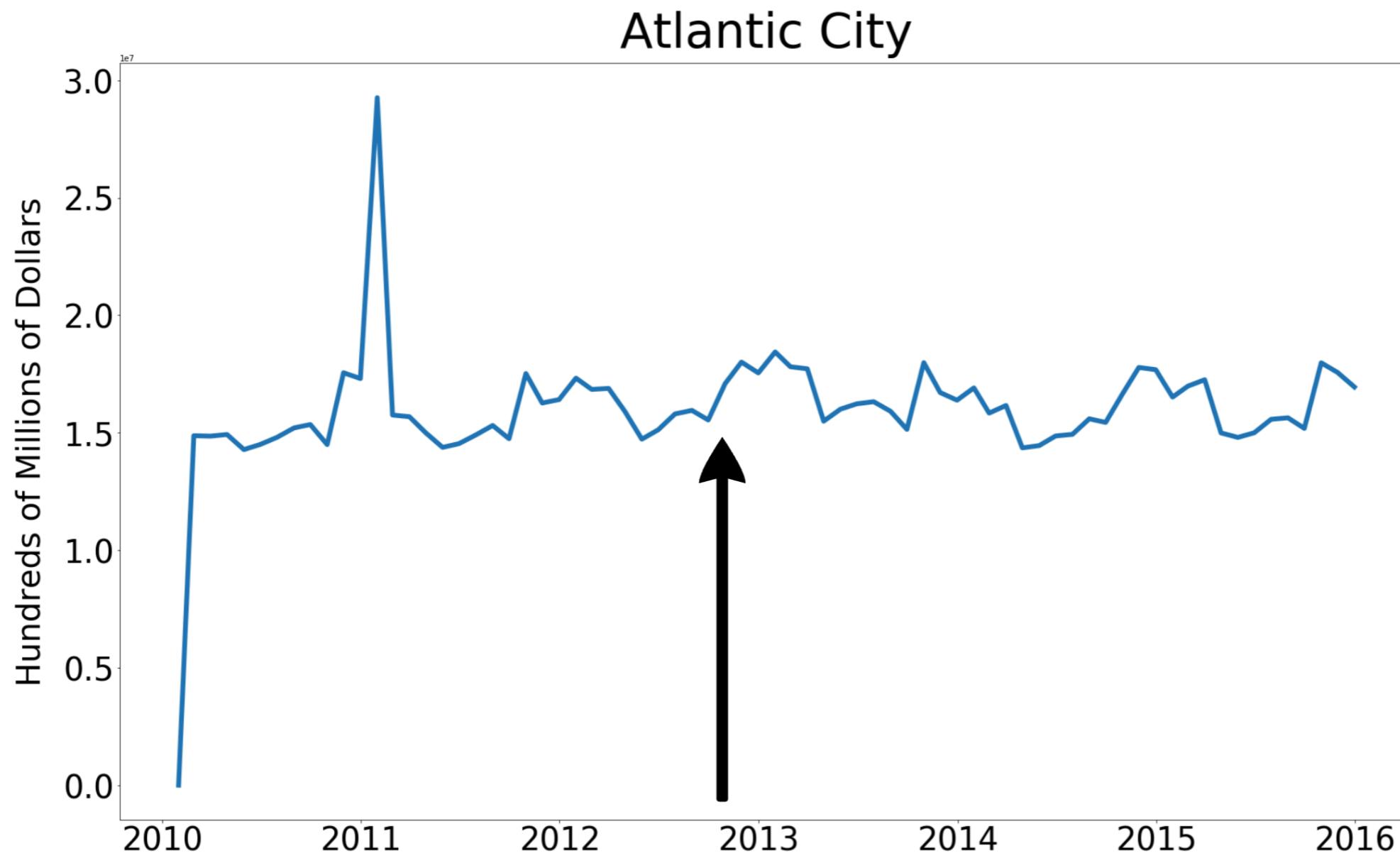
Use SARIMAX to create a moving average model to extract the sudden changes in wages and unemployment around when Hurricane Sandy occurred.

# MOVING AVERAGE MODEL FOR LEISURE WAGES

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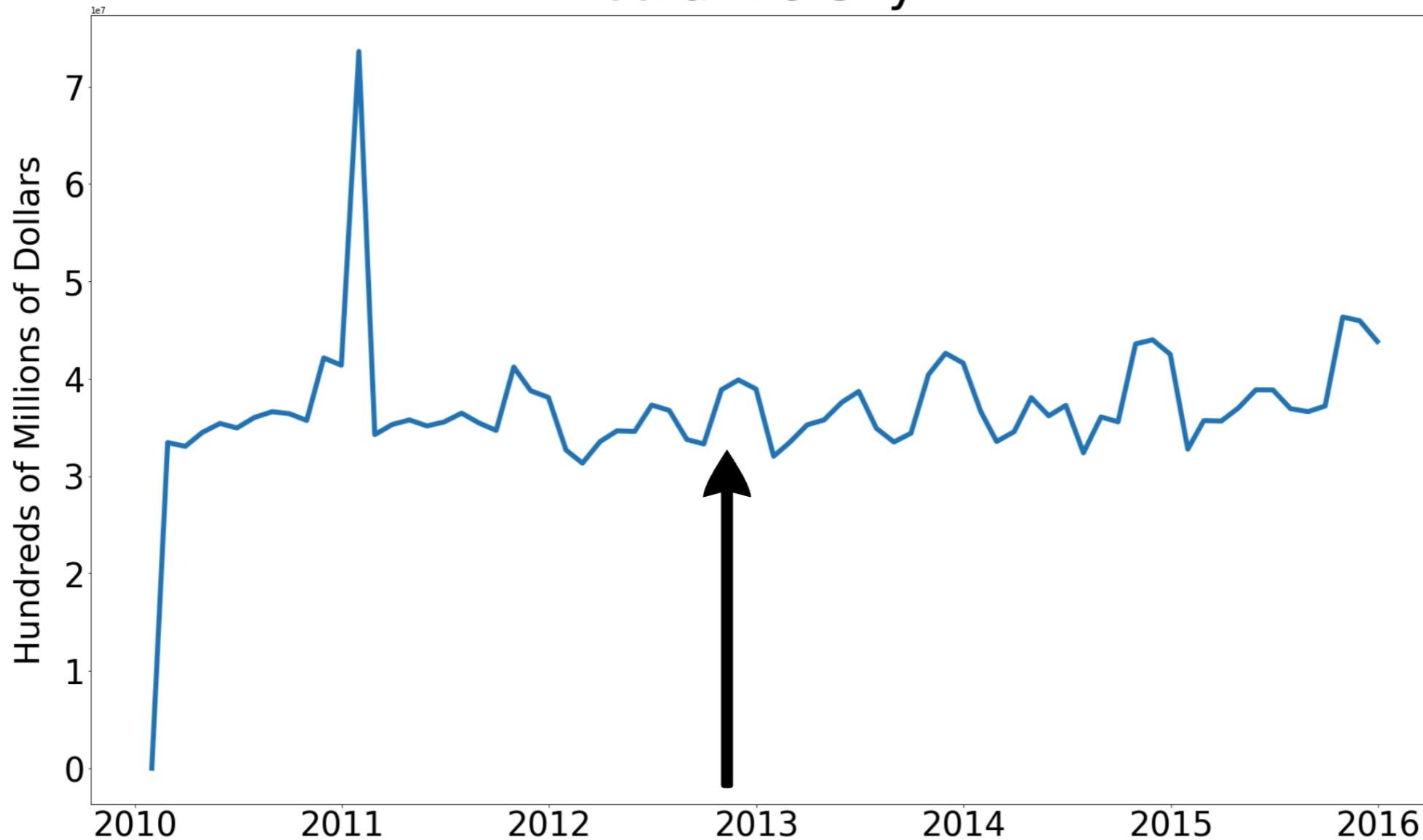
# MOVING AVERAGE MODEL FOR FINANCIAL SERVICES WAGES



# MOVING AVERAGE MODEL FOR PROFESSIONAL BUSINESS SERVICES WAGES

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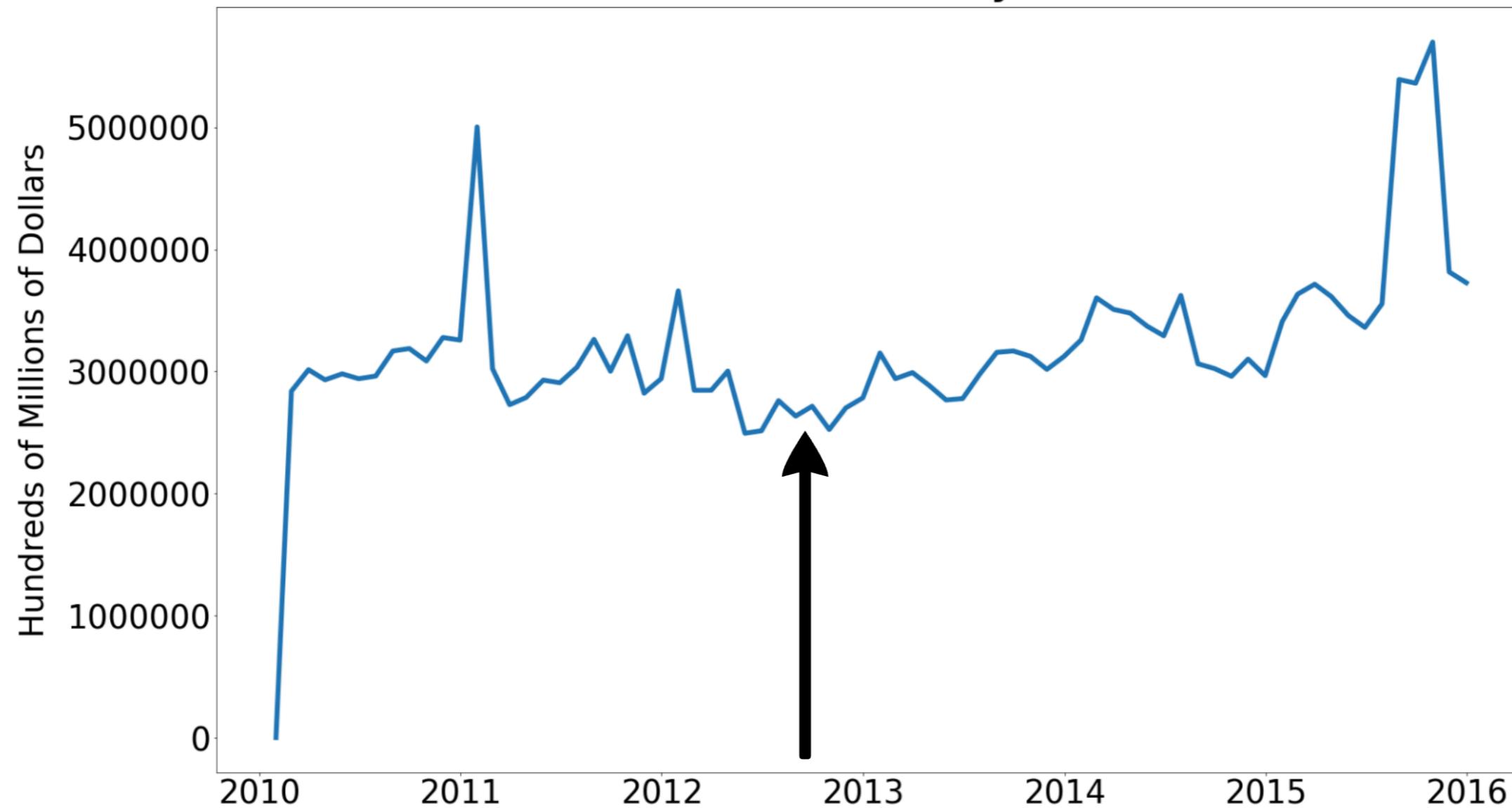
Atlantic City



# MOVING AVERAGE MODEL FOR INFORMATION SERVICES WAGES

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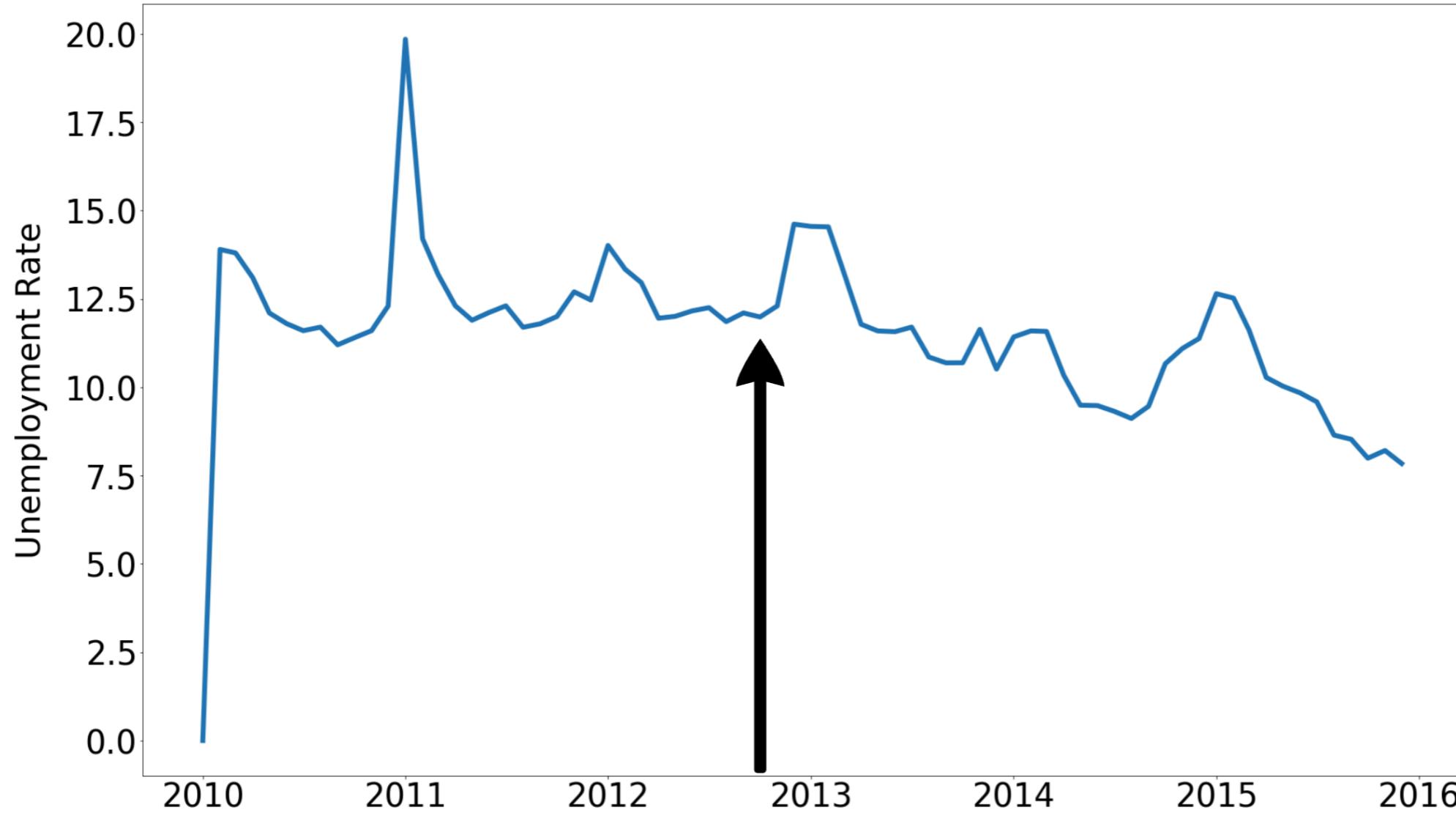
Atlantic City



# MOVING AVERAGE MODEL FOR UNEMPLOYMENT

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Atlantic City





## Findings

How do our results compare to our hypotheses and how could we have improved our methodology?

Hypotheses

Improvements



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# Future Improvements

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- Gather more data as data only spanned 5 years.
- Explore other economic metrics that may have showed clear economic losses from Hurricane Sandy.
- Quantify the economic impact of Hurricane Sandy.
- Perform same analysis on other disasters

