Introduction
The objective of this summer project was to predict the persistence of wind direction in East Central Florida. First, the weather conditions leading to southeasterly winds and the detection of pollution at locations to the northwest of a source (as shown to the right) were found. Then, the duration of these conditions was determined using observations from nearby weather stations.

Results
As lag increases, autocorrelation approaches zero (meaning that over time, the wind direction becomes less related to its previous values). After about 2 hours, as shown in the graph at below right, autocorrelation has a value of 0.5, indicating wind direction is likely not in the desired range. After about 6 hours, autocorrelation has a value of zero, indicating that wind direction is then completely uncorrelated. Once winds become southeasterly, they can reasonably be assumed to persist for a two-hour period.

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Procedures
1. Analyze wind roses and data from the TRDF weather station for the highest likelihood of wind direction persistence in June in East Central Florida
2. Write Matlab code cross-referencing TRDF data for wind direction, wind speed, and temperature with a positive detection in the virtual pollution events database
   • Results shown in bar graphs (left): 1 hour before a positive detection, the wind direction = 120–150°
   • Once wind turns to be in range of 120–150°, determine how long it will stay in range
3. Calculate temporal autocorrelation of wind direction from TRDF data for June; once wind direction is in range of 120–150°, find autocorrelation for the following 8 hours
   • Temporal autocorrelation = correlation of a variable with its own future and past values; value of 1 means data is perfectly correlated to the given value, and as it deviates from 1, wind direction becomes less predictable and out of range
4. For every time step (6 minute intervals), find the mean autocorrelation of the wind direction associated with each event, and plot autocorrelation as a scatter plot with the colormap showing deviation from that mean and a line of the overall mean of the data

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