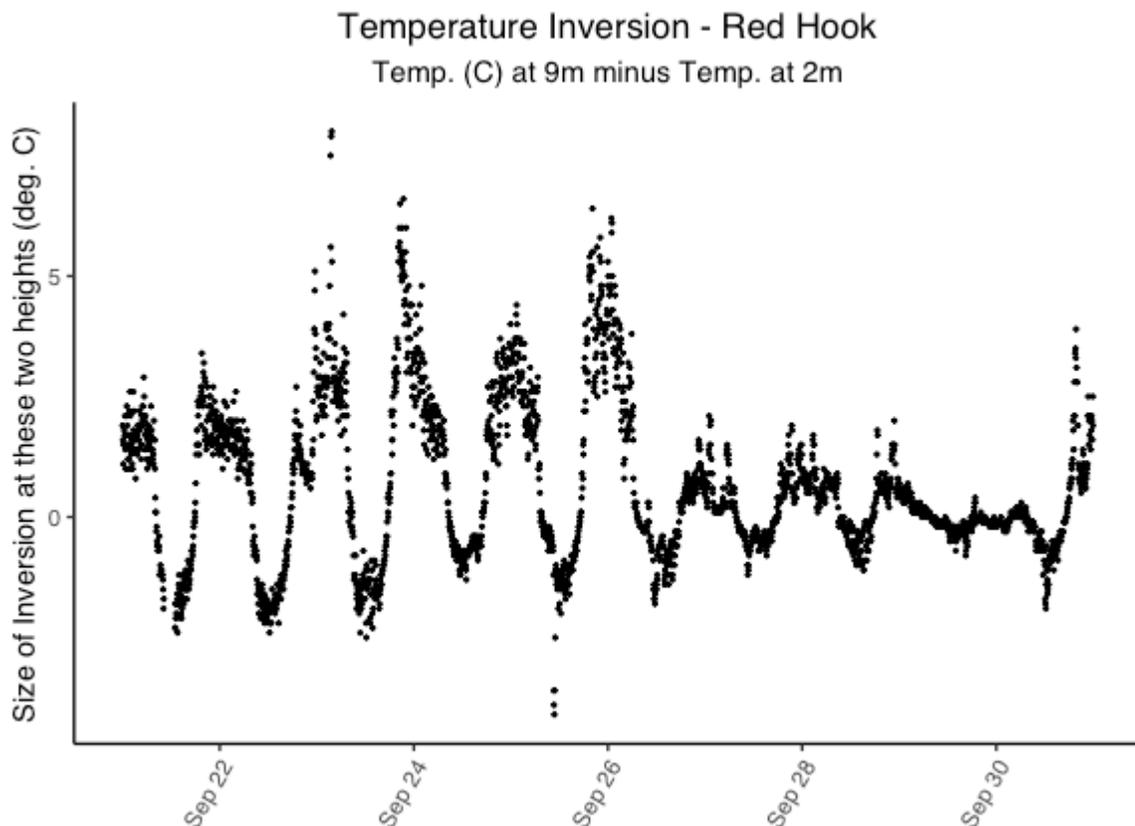


Bard

Data from the Center for the Study of Land, Air, and Water at Bard College
Air Quality Research in Kingston, New York
Dataset 4

General Trends: Temperature Inversions

While some natural phenomena such as heavy rainfall can decrease our exposure to air pollution, others can increase it. One of these phenomena is a temperature inversion. Normally, colder air is higher up in the atmosphere, but in a valley such as ours, especially in the winter, daylight hours are fewer and the earth's heat dissipates quickly, keeping colder, denser air at the earth's surface. Pollutants such as vehicle exhaust or woodsmoke are trapped close to the earth, where we breathe. The valley acts as a "sink" that can trap pollutants for days. Significant region-scale inversions are most detectable using LiDar or Radiosonde data to detect air temperatures from ground level up several thousand meters. However, smaller-scale inversions are detectable at a difference of just a mere few meters. Often meteorological data towers will be collecting temperature data at two different heights in order to detect a significant differential. This type of information can help to inform community members if or when to participate in certain activities such as crop spraying or wood burning. The below figure shows small-scale inversions over the course of a handful of days in September from the New York State Mesonet station located in Red Hook, New York.



The data portray a cyclical pattern of inversion between 9m and 2m, often with more indication of inversion at night. This makes sense, given that a temperature inversion will typically form under clear night skies when the sun sets and the earth's surface cools. The daytime is when inversion potential is least expected due to the heating of the earth's surface from the sun. However, the decay period for an inversion can sometimes last well into the day and it is wise to take this into consideration when planning the day's activities. Read about ways to tell that you are experiencing a temperature inversion [here](#). Small-scale temperature inversions can have an effect on a person's exposure to pollution depending on where they are situated, but more regional-scale inversions can affect entire communities. The below figure shows particulate concentration data from our field site on December 12, 2020, a day that we determined there to be a significant, region-wide inversion using Radiosonde data made available by NOAA.

