

Climate & Air Quality Data Activity

Activity Overview

1-2 hours introducing measurements and the online resources for local climate and air quality data. Formulating student questions and investigations based upon day-long, week-long and month- or year-long measurement periods.

Potential Student Objectives:

(To Teachers: this is a non-exhaustive list of suggestions: tailor it to your own students' needs and the broader learning objectives of your class.)

- Train students in techniques for the collection of weather data and air quality measurements (O₃ and PM-2.5 aerosols)
 - Discussion: What could corrupt our data?
 - Establish measurement protocols for all students to follow
- Collect measurements into a digital dataset
- Articulate differences between “snapshot” data and longer-term (longitudinal) measurements
 - Differentiate between “climate” and “weather”
 - What questions can we answer with measurements from a day, a week, a month, a year, multiple years?
- Compare collected weather/climate measurements against long-term climate data from official sources (NOAA US Climate Data)
- Compare air quality measurements against EPA and Colorado Department of Health and Environment health thresholds
 - Research the potential causes of O₃ and PM-2.5 traces in local air
 - Where does it come from?
 - How far does it travel?
 - Are there local sources that may produce O₃ or PM-2.5?
 - Research health effects of high exposure to O₃ and PM-2.5
- Explore potential correlations between weather conditions and air quality measurements (this will vary locally!)
 - Location: [GLOBE GPS Protocol](#)
 - Air Temperature: [GLOBE Minimum/Maximum/Current Air Temperature Protocol](#)
 - Humidity: [GLOBE Relative Humidity Protocol](#)
 - O₃: [GLOBE Surface Ozone Protocol](#)
 - PM-2.5 Aerosol Measurements
 - Aerosols: [GLOBE Aerosols Protocol](#)
 - Time of Day
 - Wind Speed & Direction (Wind Speed & Direction Measurements)
 - Cloud Conditions: [GLOBE Cloud & Contrails Protocol](#)
 - Fires and/or other disturbances nearby: Use Online website and/or NASA Worldview
 - Other data which may be important (local traffic, e.g., student-led questions)
- Compare measurements directly with peers in other classes or schools
 - Note differences in data sets and hypothesize causes in differences

- Explore surprises or anomalies in the data
- **If** air quality measurements approach / exceed EPA or State of Colorado Health Standards at any time:
 - Research & hypothesize potential causes
 - How can we use our measurements to test further?
 - Research & hypothesize potential solutions
 - Potentially: explore civic engagement
 - Contact local / state government officials (letter writing, emails)
 - Include the data! (graph, table, etc)
 - Local newspaper or TV channel

Resources:

NASA GLOBE Protocols:

[Ozone] [Air Temp] [Humidity] [Wind Direction] [Wind Speed] [Cloud Conditions]

Instrument Resources: (1 each per classroom, \$220 total + optional ozone strips)

HoldPeak 5800D PM 2.5 Aerosol Detector, \$119.99

<https://www.amazon.com/HOLDPEAK-Detector-Backlight-Environmental-Available/dp/B01EKVP6OE>

Ambient Weather WS-0900-IP Wireless Internet Remote Monitoring Weather Station, \$99.99

<https://www.amazon.com/dp/B01HH4WZXG/>

Ozone GLOBE Kit Ozone strips and photometers (still looking for best instrument to meet the GLOBE requirement)

Local Traffic Data:

<https://denvergov.org/maps/map/trafficc cameras>

CO Wildfires:

<http://www.coemergency.com/2015/04/current-colorado-wildfire-map.html>

<http://www.colorado.gov/airquality/wildfire.aspx>

Climate Colorado data:

<http://www.usclimatedata.com/climate/colorado/united-states/3175>

Colorado Air Quality (Dept of Public Health & Environment):

<http://www.colorado.gov/airquality/>

