Air Quality Analysis

Objectives

a) assess air pollutants at selected sites in Los Angeles (SMC campuses)
b) compare data with air quality standards and other reported values
c) evaluate environmental and health effects of air pollution
d) compare pollution levels across locations and time

Background

Air is composed of a mixture of gases, largely invisible to us. The gases are widely variable, from oxygen - a necessity for living things on Earth – to **air pollutants** that are harmful to human health. Los Angeles faces air quality challenges from pollutants that originate from transportation sources and, seasonally, wildfires. The color-coded Air Quality Index (AQI) is linked to concentrations of pollutants and helps assess hazards of air pollution.

Particulate matter (**PM**) is a complex mixture of solid particles and liquid droplets that are suspended in the air that you breathe. These small spheres are categorized by diameter; dust and pollen are typically about 10 μm, or **PM_{10}**. Smoke and soot from fires contain even smaller particles, **$PM_{2.5}$**, which have a diameter of 2.5 μm or less. When inhaled, these particles can pass through the lungs and into your bloodstream. The health effects from $PM_{2.5}$ range from coughing and asthmas to cancer and premature death.

Air Quality Index (AQI) Values	Levels of Health Concern	Colors
When the AQI is in this range:	*...air quality conditions are:*	*...as symbolized by this color:*
0 - 50	Good	Green
51 - 100	Moderate	Yellow
101 - 150	Unhealthy for Sensitive Groups	Orange
151 - 200	Unhealthy	Red
201 - 300	Very Unhealthy	Purple
301 - 500	Hazardous	Maroon

Table 1 – Air Quality Index (AQI) scale – levels linked to color/advisory (from AirNow.gov)

The U.S. Environmental Protection Agency (EPA) regulates and reports levels of PM, **ozone** (**O_3**), carbon monoxide, sulfur dioxide, and nitrogen dioxide. The most hazardous of these are O_3 and PM. Even at low concentrations, O_3 can reduce lung function. And, though not regulated, **volatile organic compounds** (**VOC**) are also present in air from burn areas and can cause cancer.

Experimental Procedure

1. Students will work collaboratively in groups across different campuses. Location, working group and handheld monitor will be assigned on the lab day.

2. When you arrive at the location, confirm all are present before real-time monitoring to use
   - handheld air quality monitor
   - phone with weather app
   - phone/laptop/tablet to access iQAir

Part A: Location Data

1. Let the monitor run for at least 5 minutes to stabilize measurement readings. Record exact location, date and time

2. Using data from the hand-held monitor, record levels of each pollutant.
   Press the white button to toggle between PM_{10} and $PM_{2.5}$
   - PM_{10}
   - $PM_{2.5}$
   - HCHO (formaldehyde)
   - TVOC (total volatile organic compounds)
   - AQI color – refer to Table 1 on previous page for values and levels of health concern

3. Include qualitative observations about the local air quality (e.g. clear skies, visible smoke, strong or unusual smells)

4. Communicate with other groups to include data from all six locations

Part B: Regional Data

1. At the location, use a phone, laptop or tablet to access Apple Weather app
   scroll down and tap on “Air Quality”
   scroll down for “Pollutant Details”
   Record reported AQI and PM levels

2. At the location, use a phone, laptop or tablet to access iQAir
   (https://www.iqair.com/usa/california/los-angeles)
   Record reported AQI and PM levels

3. At the location, use a phone, laptop or tablet to access PurpleAir
   Click on “Explore the Map” to find the nearest sensor to the location
   Record reported AQI and PM levels