This assignment will be collected at the beginning of class on Friday November 4th.

For this assignment, you will be using information that you will obtain from the US Environmental Protection Agency’s web site:
http://www.epa.gov/oar/visibility/monitor.html
and the Interagency Monitoring of Protected Visual Environments web site:
http://vista.cira.colostate.edu/improve/Data/Graphic_Viewer/seasonal.htm
In this assignment, you will practice looking at maps of data, and describing what you see quantitatively (use numbers!), and drawing some general conclusions about the spatial variability of aerosol concentrations across the U.S. Be prepared to discuss this in class on Friday November 4th!

Total points: 50; 10 points each

1) Go to the EPA’s web site: http://www.epa.gov/oar/visibility/monitor.html. You will see a map of the US national park system, and below the map a list of the national parks with links to “pollutants”, “photos”, and “visibility trends”. Pick one national park (make sure that this park has links to “pollutants” and “visibility trends” – not all do!).
   a) What park did you pick?

   b) Where in the U.S. is it located?

   c) What is the nearest city upwind of this park (hint: remember the mid-latitude westerlies).

   d) Click on the “Photos” link to see a “good” and “bad” visibility day. Describe what you see.

2) Click on the “Pollutants” link.
   a) What are the different chemicals contributing to particle pollution in this national park?
b) What are the first and second most abundant pollutants?

c) What year is the data from?

d) What are their sources according to the web site? Are these primary or secondary sources of pollutants? Explain your answer.

3) Go back to the list of national parks, and click on “Visibility trends” under your national park. From the plot, does there appear to be a trend (clearly decreasing or increasing over time) in the best and worst visibility days? How far back in time are the measurements reported?

4) Now go to the Interagency Monitoring of Protected Visual Environments web site: http://vista.cira.colostate.edu/improve/Data/Graphic_Viewer/seasonal.htm. This site shows the spatial patterns of PM$_{2.5}$ (aerosol particles with a diameter of less than 2.5 µm) mass across the U.S. On the map, click on your national park.

a) How does the annual fine mass concentration in your national park compare to other regions of the country (be quantitative!)?

b) On the graph to the right of the map, describe the seasonal variability of fine particle mass in terms of total fine particle mass (in µg/m$^3$) – for example, how do summer concentrations compare to winter concentrations?

c) What are the one or two most abundant chemicals according to this graph?

d) What contributes to the seasonal variability?
6) On the dropdown menu above the map, choose the most abundant chemical contributing to fine particle mass (e.g. if sulfate is most abundant, choose ammonium sulfate, if it’s not clear which of two species is more abundant, choose one of them). a) How does the mass concentration of this species in your national park compare to other regions of the country (be quantitative!)?

b) Is it a similar pattern to total fine particle (PM$_{2.5}$) mass? If not, why and how is it different?

Extra credit:
Read about EPA’s Regional Haze Program ([http://www.epa.gov/oar/visibility/program.html](http://www.epa.gov/oar/visibility/program.html))? Do you think improving visibility in the U.S. National Park is a worthwhile effort?