Go to https://www2.usgs.gov/climate_landuse/clu_rd/nccv/viewer.asp. The viewer displays data from the 5th Climate Model Intercomparison Project (CMIP5). The raw data is statistically downscaled to the county level to project local changes in temperature and precipitation. Such information may then be used by businesses and government entities to plan for climate change scenarios.

Under the “scenario, time period, units” tab, select the RCP8.5 scenario, 2075–2099 vs. 1981–2010 time period, and English units. The map displays changes in the annual mean maximum temperature for the chosen options, which shows warming of 6–10°F across the U.S. Click on New York on the map. This should zoom into New York state. Then click on Albany County.

Click on the “climograph/histogram” tab. You should now see two plots on the bottom. Focus on the bottom left plot, showing the maximum temperature by month for the CMIP5 model mean. The blue line gives the CMIP5 model mean for 1981–2010 (current climate), and the red line gives the CMIP5 model mean for 2075-2099 (RCP8.5 climate) for Albany County. You get can get the exact monthly value by moving the cursor over each data point. Now, change the variable in the pull-down menu to “minimum temperature.” The time series should now reflect the minimum temperature. For the following question, you will need both the maximum and minimum temperatures.

1) For January, calculate the change in heating degree days between the RCP8.5 climate and current climate. For July, calculate the change in cooling degree days between the RCP8.5 climate and current climate. You will need to recall the formula for heating and cooling degree days, and note that there are 31 days in both January and July. How might you expect energy usage to shift due to changes in degree days?

2) If heating demand mostly drives natural gas demand and air conditioning demand mostly drives electricity demand, how might an energy company use this information to plan for the future in lieu of using an average of the most recent 30 years?

Click on the Continental United States button to zoom back out to the whole U.S. Change the variable to “precipitation” and the region type to “watersheds.” Click on the California region, then Sacramento, and finally the North Fork Feather watershed. This watershed is one of main sources of water for Lake Oroville, the dam that had major problems with its spillway last year. There are only minor changes in monthly precipitation with slight increases in January and February.

3) Change the variable to “snow.” Hypothesize why there is a drastic reduction in snow during the cold season in the watershed for the RCP8.5 climate and support your hypothesis with other data from the viewer. What does this imply about the ratio between rain and snow events? Note that there is a wide range of elevations across the
watershed.

4) Next, change the variable to “runoff.” Compare the current climate runoff with the RCP8.5 climate runoff in the bottom left figure. Why does the maximum runoff shift from earlier in the year in the warmer climate? Why does the runoff decline faster into the spring and summer months in the warmer climate? Why would this information be important for a water resource manager for Lake Oroville?

5) Change the variable to “soil storage.” How does the seasonal cycle of soil moisture change from the current to RCP8.5 climates, and why is such information important for wildland fire management in the area.