Analyzing changes in precipitation or water content with NASA's Grace, TRMM and Earth Observations Databases.

A. **From the NASA NEO web site:** "These maps show how water stored on and in the land changes from month to month. The maps are blue where there is more water than average and red where there is less water. Water accumulates on land in rivers and lakes, as ground water and soil moisture, and as snow and ice. Scientists track water both to understand the water cycle and to monitor the availability of fresh water. The maps show that water levels change throughout the year with the seasons. Changes from year to year may reveal drought or an excess of water.

   Go to NASA's Earth Observation database (http://neo.sci.gsfc.nasa.gov/Search.html) Click on Land and then choose the Water Equivalent Anomaly monthly dataset. Click on view and the map shows the world view. You can download the data to Google Earth as well.   More instructions on using the NEO tool are found here: http://serc.carleton.edu/eet/albedo/index.html.

B. Using NASA Grace on the Eyes on Earth Web Site (this is the same data used in part A above, but using an alternative means of accessing it.)

1.   Go to http://climate.nasa.gov/Eyes/eyes.html
2.   Under Missions, choose GRACE
3.   At the bottom select a speed of "U." This will keep the globe from spinning while you are working on it.
4.   Using your cursor, rotate the earth until the continental U.S. is visible.
5.   On the left, click on the light bulb so that the U.S. is visible.
6.   On the top left under the "AURA" satellite, click the + sign to make the U.S. appear larger.
7.   On the right, under SELECT A VIEW, choose global.
8.   Under SHOW DATA MAP, choose either Gravity Field Map Monthly or Interpolated.
9.   On the left, click on "choose dates." One can go back to August 2002 with the GRACE data. Next choose a month and later date, such as August 2004. Click on Submit. Note, choosing smaller intervals means a smaller file for download. Pressing the play button above will play a simulation, month by month through the time interval selected. Or, one can use the right arrow to advance manually month by month. Using print screen (on a Windows Platform) will allow you to save the images.

C. Using NASA TRMM (http://trmm.gsfc.nasa.gov/) at Giovanni.

1. How has rainfall changed.
2. Go to http://disc.gsfc.nasa.gov/techlab/giovanni
3. Click on TRMM rainfall products (TOVAS)
4. Click on monthly global precipitation (GPCP), non-Java version
5. Set the appropriate Lat Lon coordinates
6. Try three or four plots: e.g., 1979 to 1986; then 1987 to 1996; next 1999 to present.
7. Custom y-axis: min 2000, max 4000, interval 200, Generate Plot
8. A plot shows up in another browser window. What are the ranges of rainfall?
9. Save plot as gif file