El Niño's Powerful Reach

Educational Activities

Is El Niño Coming?

Summary:
Participants learn how El Niño events are predicted.

Grade level:
Intermediate (grades 5-8)
Secondary (grades 9-12)

Time needed:
one, 60-minute class

Learning Objectives:

- Demonstrate an understanding of the principles and methods of scientific inquiry
- Demonstrate the use of scientific inquiry through prediction
- Use maps and graphs to identify and explain how natural resources can be used through science and technology to solve local, national and global challenges

Background:

The most immediately obvious effect of El Niño is a change in the weather. El Niño causes changes in weather patterns because it affects ocean and air temperatures and currents. This changes the amount of precipitation in the tropics and around the globe. Areas of the world that usually receive heavy rainfall, particularly Indonesia and Australia, experience terrible droughts during an El Niño. These droughts often lead to famine and devastating wild fires. Areas in North and South America that would normally be very dry, experience heavy rain and snowfall during an El Niño. Heavier precipitation can lead to positive affects like bountiful harvests and increased water supplies. Unfortunately, they often lead to widespread flooding and even mudslides in some areas. El Niño can also cause severe and extreme weather events, such as typhoons and tornadoes, to strike unusual locations.

In the United States, three types of unusual weather patterns generally occur during El Niño years. Western and southern states experience above normal rainfall; warmer than normal temperatures prevail in Alaska, the Northeast and the Pacific Northwest; and cooler than normal conditions affect the Southeast. Western states - particularly California - often experience the most severe weather impacts, including torrential rains, flooding and mudslides. Other states experience less obvious, but no less real impacts. These serious weather impacts make El Niño prediction very important. Predication will help save lives and reduce damages.

Procedure A:

1. Review the Long Distance Connections and Is El Niño Coming? sections of the El Niño exhibit interactive available at http://www.forces.si.edu/.

2. Briefly explain in your own words the connection between El Niño and Drought. What country experienced a serious El Nino-caused drought at the beginning of the 20th Century?

3. Study Figure 1 - El Niño Effects Map from the NOAA Climate Prediction Center and Figure 2 - U.S. Drought Outlook.

4. Think about the weather in the United States today and the Drought Forecast compared to the Effects Map. Do you think the United States is currently or will soon experience El Niño

WARM EPISODE RELATIONSHIPS   DECEMBER - FEBRUARY
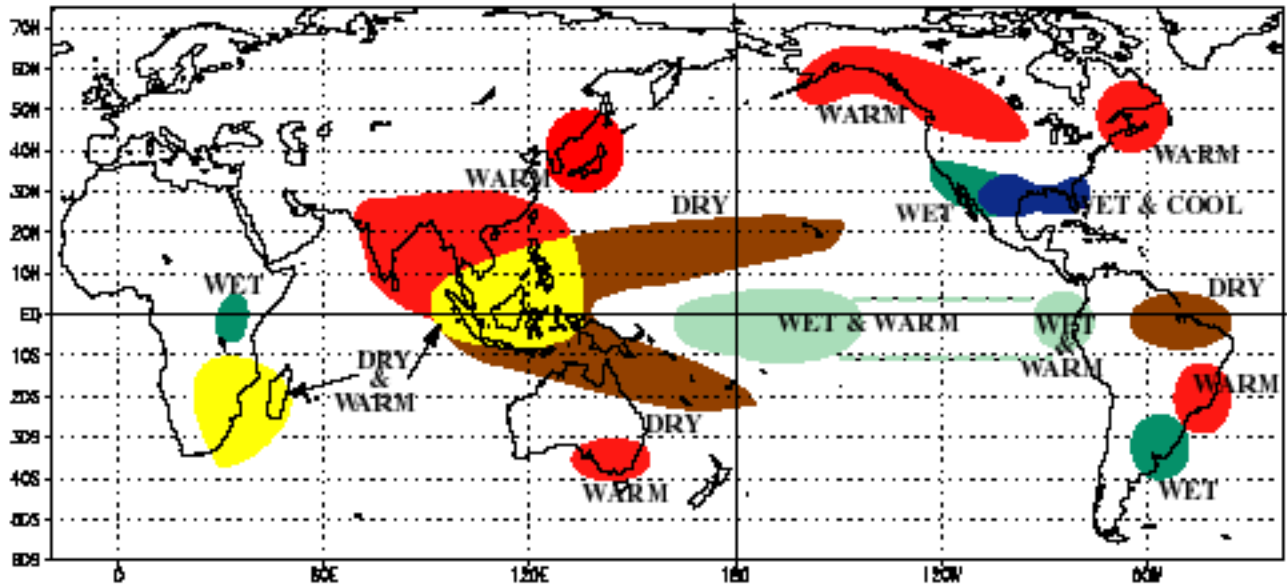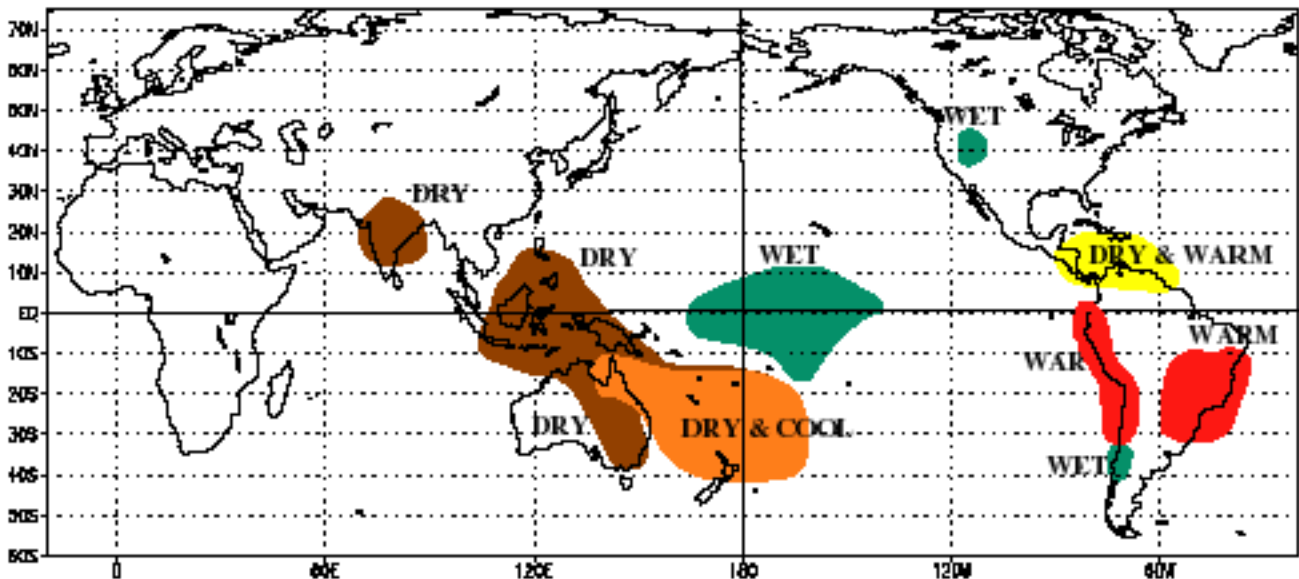
WARM EPISODE RELATIONSHIPS   JUNE - AUGUST

Figure 1 - El Niño Effects Map produced by the NOAA Climate Prediction Center.

U.S. Seasonal Drought Outlook
Through February 2006
Released November 17, 2005

KEY:

- Drought to persist or intensify
- Drought ongoing, some improvement
- Drought likely to improve, impacts ease
- Drought development likely

Depicts general, large-scale trends based on subjectively derived probabilities guided by numerous indicators, including short- and long-range statistical and dynamical forecasts. Short-term events -- such as individual storms -- cannot be accurately forecast more that a few days in advance, so use caution if using this outlook for applications -- such as crops -- that can be affected by such events. "Ongoing" drought areas are schematically approximated from the Drought Monitor (D1 to D4). For weekly drought updates, see the latest Drought Monitor map and text. NOTE: the green improvement areas imply at least a 1-category improvement in the Drought Monitor intensity levels, but do not necessarily imply drought elimination.
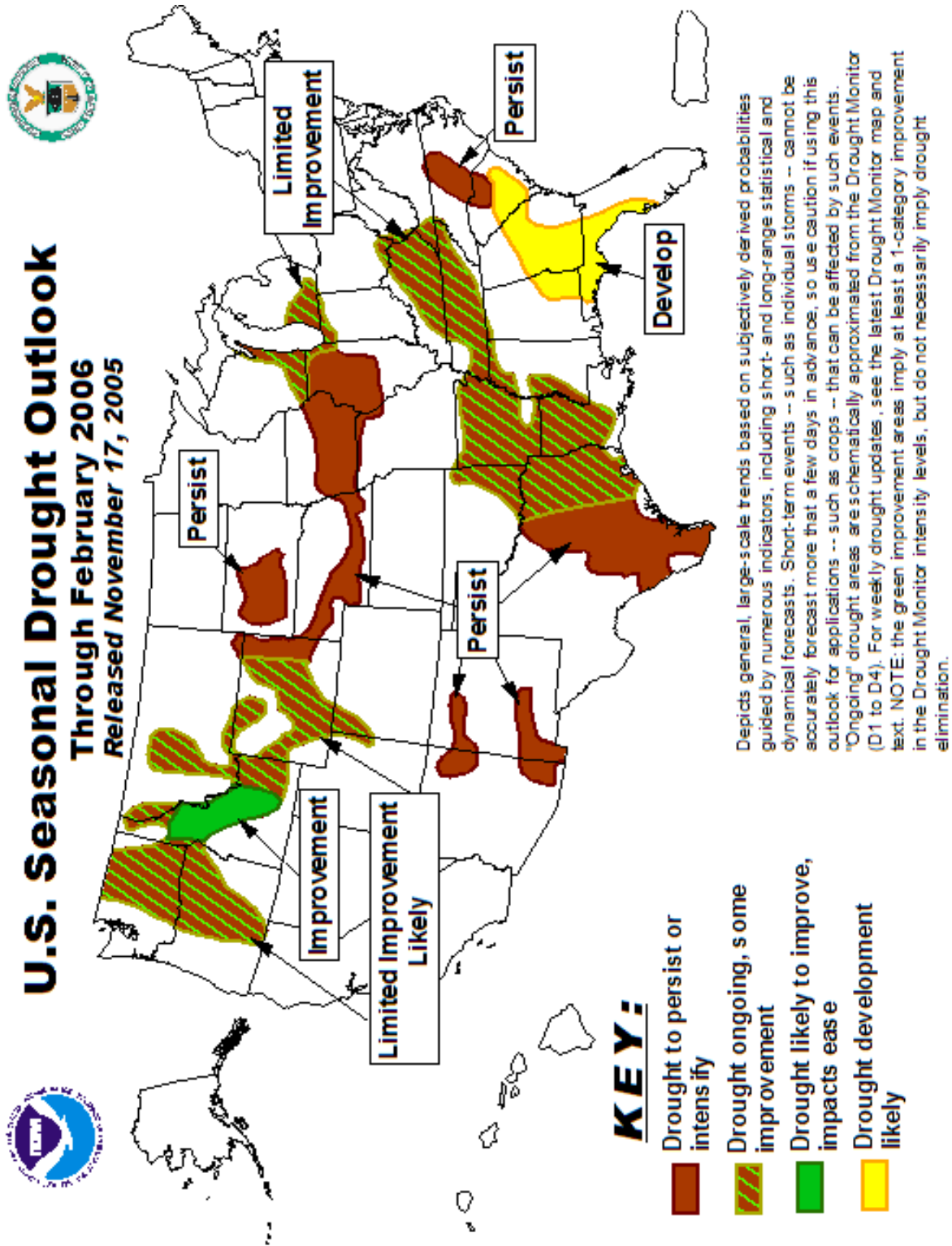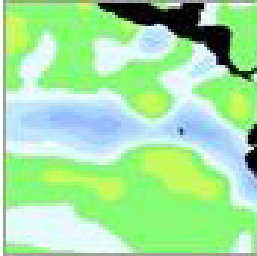
Figure 2 - U.S. Drought Outlook produced by the NOAA Climate Prediction Center.

drought effects? Explain your answer.

5. Examine Figures 3 and 4 - Normal and El Niño Sea Surface Temperature (SST) graphics. These pictures give a visual representation of data collected by satellites and buoys about the sea surface temperature during a normal year and during an El Niño event. Red areas have higher temperatures (warmer waters) and blue areas have lower temperatures (colder waters). Where in the Pacific Ocean does the sea surface temperature change during an El Niño? Does the water become colder or warmer? Explain your answer.
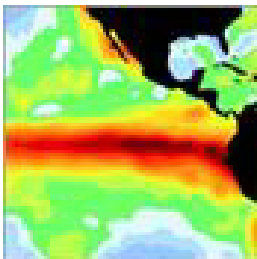
6. Now go to http://www.cpc.noaa.gov/products/analysis_monitoring/enso_update/gsstanim.html and watch the current sea surface temperatures in action. Does this animation show any evidence of a current El Niño? Explain your answer.

Figure 3 (top) and 4 (bottom)
Normal and El Nino Sea
Surface Temperatures

Analysis and concluding questions:

1. Did El Niño events only happen in the past, or do El Nino events still occur? Do you think El Niño is an important area for scientific study today? Why or why not?

2. How can El Niño effect life in the earth's oceans?

3. List three ways El Nino have an impact on human cultures around the world today.

   Impact #1:

   Impact #2:

   Impact #3:

7. What did this project teach you about how scientists use data to better understand our world and predict our future climate?