

Teacher Information

El Nino

I. Objectives

A. Forming Concepts (Introductory) Objectives

1. Explain what El Nino is, where it is located, and how it is created.
2. Describe the weather changes caused by El Nino.
3. Draw the patterns of El Nino on a world map.

B. Interpreting Data Objectives

1. List the years of previous El Nino events.
2. Locate and graph precipitation for locations in the eastern and western Pacific.
3. Analyze precipitation in the eastern and western Pacific in terms of amount and when it occurred.
4. Compare precipitation amounts in the eastern and western Pacific to occurrences of El Nino.

C. Applying Principles Objectives

1. Predict the economic effects El Nino will have on the areas it reaches.
2. Predict when the next El Nino will develop.
3. Predict what would happen to coastal areas of the Atlantic Ocean if El Ninos developed off the coast of Africa.

II. Interdisciplinary Uses

A. Social Studies

1. Introduce the effects of weather on the economy.
2. Discuss the effects of hurricanes on low-lying lands in the western Pacific.
3. Discuss the effects of hurricanes on low-lying lands in the eastern Pacific.
4. Practice map interpretation skills.

B. Math

1. Interpret graphical numerical data.
2. Use averaging in a "real world" application.
3. Interpret unmarked intervals on a map.
4. Apply multiplication of rates such as "Increase in Rainfall per Degree of Increase in Sea Surface Temperature."
5. Predict future El Nino events using student-computed data.

C. Language Arts

1. Develop detailed descriptions of El Nino and its effects.
2. Elaborate a list of economic damages into written explanations for the damages.
3. Convert somewhat technical language into simpler terms.

III. Science Standards Coordination

The El Nino activity has been designed to incorporate science standards as specified by the National Science Education Standards (NSES) and the National Science Teachers Association (NSTA) Scope, Sequence, and Coordination (SS&C) of Secondary School Science. Only the major topics are listed. For further explanation of each standard see the complete documents:

NSES - National Academy Press, 2101 Constitution Ave, NW,
Washington, DC 20481

NSTA - 1840 Wilson Blvd, Arlington, VA 22201-3000

NSES	SS&C
Structure of earth systems	Water cycle
Earth in the solar system	Precipitation
Transfer of energy	Wind
Understanding about science and technology	Sun as an energy source
Science and technology in society	Water

IV. Advanced Preparation

A. Materials

1. One computer per two or three students is a recommended minimum.
2. One copy of the Student Activity Book for each student or group of students.

B. Time Required for Completing the Activity

1. The *Get Info* section takes about 25 minutes.
2. The *Gather Data* section takes about 25 minutes if the students complete only the "1's" of parts B and C (Western Pacific 1, Eastern Pacific 1). The "1" sites have the best graphs of the data. *Gather Data* takes about an hour if all parts of Sections B and C are completed.
3. The *Application* section does not require the use of the Internet after completing the previous sections of the activity.
4. The *Social Studies/Language Arts* section requires a print out of a site. The activity takes a full class period to do well, or it can be assigned for homework.
5. The *Math* section takes about 25 minutes. The required Web page can be printed and taken to class to complete the activity.

C. Teacher Familiarity

Preview these materials thoroughly. As with all these activities, before using this activity in class, review the sites and work through the activity yourself to learn about El Nino so you can answer questions or direct students to the answers.

The activity is set up so students are taken to sites containing information that will be used to answer questions regarding El Nino events. The sites contain either the answers or the information from which the students can infer the answers. At the end of the activity, there is a list of enrichment activities and related web sites.

D. Select Questions for Students to Answer

It would be prudent for you to read the questions students will be expected to answer. These questions are in order of ascending difficulty. Depending on grade level and ability level, you might want to assign specific questions for your students.

E. Student Grouping

These activities can be done individually or in small groups of two or three students. Students who have Internet access can also do them at home for extra credit.

F. Software Requirements and Duplication Preparation

1. Adobe Acrobat Reader is required to download the pages. Click the "Tech Info" link on the Science with NOAA Research homepage to download Acrobat Reader.
2. Download the Teacher Information, Teacher Key, and Student Activity Book PDF files from the "Teacher Info" web page.
3. Duplicate and distribute student pages. Ideally, each student should have a copy of the Student Activity Book that should be distributed and discussed the day before the exercise.