

## Teacher Resources and Student Activities: Earthquakes in Middle and Secondary Schools

**DLESE (Digital Library for Earth System Education)** <http://www.dlese.org/library/index.jsp>

A free searchable site for high quality Earth Science lessons of all topics. This site has taken the best of the best available on the web and elsewhere and placed them on one site. Teachers can search by grade level, resource type, collections (published materials from other sources) and by standards. Just typing in the word “Teaching Boxes” in the search box provides a wealth of resources. This is the only site that science teachers will need as they search for lessons pertaining to the topic they are teaching. The DLESE collections meet seven specific review criteria: high scientific accuracy, good pedagogical effectiveness, ease of use, clarity and completeness of documentation, motivating for learners, show robustness, and illustrate significance of content.

**DLESE Teaching Boxes-Earthquakes** <http://www.teachingboxes.org/earthquakes/>

The goal of this Teaching Box is to teach students about how and why earthquakes cause damage. **Living in Earthquake Country** explores seismic waves, the ability of scientists to predict the likelihood and severity of earthquakes at specific locations, the difference between magnitude and intensity, the occurrence of earthquakes along patches of planar faults, and the potential damage caused by landslides, liquefaction, or structural failure related to earthquakes. At the end of the six lessons there are EXTRA lessons using the interactive [Rapid Earthquake Viewer](#) visualization tool (REV). These lessons are also meant to augment the original lessons in the "Living in Earthquake Country" Teaching Box with additional data-related activities. REV provides access to data from seismograph stations around the world and is a collaborative effort of the University of South Carolina and IRIS.

**EarthScope** <http://www.earthscope.org/eno> EarthScope and its partners have developed activities, lesson plans, map tools, visualizations, and much more to help students and teachers work with EarthScope data and science results. Free EarthScope materials include teachable moments, research summaries, links to research projects, and interactions with EarthScope scientists and staff.

**Exploratorium** <http://www.exploratorium.edu/faultline/index.html>

Faultline Seismic Science at the Epicenter . A site that has hands-on activities, graphics, podcasts, videos, music, photos and web links. There are five categories from which to choose: **Live Eye on the Earth, Great Shakes, Quake Basics, Damage Control** and **Active Zone**.

**IGS (Idaho Geological Survey)** <http://www.idahogeology.org/> A publication available for download titled “Student Activities for Studying Earthquakes in Secondary Schools,” Idaho Geological Survey S-95-2. Go to the home page. In the search box, at the top, type in [S-95-2](#). These four activities were designed by B. Peterson and K. Othberg shortly after the Borah Peak 1983 Earthquake and can be found at the above link. The activities are meant to “augment

courses in earth science.” The first three activities apply directly to Idaho and can be used in conjunction with the Idaho Bureau of Homeland Security Publication “[Putting Down Roots in Earthquake Country](#).” The fourth activity, “Seismic Activity at Tectonic Plate boundaries” is a computer activity, but is outdated and not usable. However, there are many websites that teachers can now access to actively involve students in data analysis or demonstrate similar information. Some of the resources available on the web can be found at the following web sites.

**IGS (Idaho Geological Survey)** <http://www.idahogeology.org/> On the home page, select Geologic Hazards from the left side bar. This opens a page where you can select one of three hazards—Earthquakes, Landslides, or Volcanoes. Each hazard’s site contains additional links and information related to hazards in Idaho. Select Earthquakes to open a page with many options related to earthquakes. Tag this site in your “Favorites.”

- Idaho Miocene – Quaternary Interactive Fault Map (Locate faults and view information about rates and sense of movement)
- Idaho Miocene – Quaternary fault Map – Google Earth Version (Use the popular Google Earth viewer to locate faults and view information about the faults.)

**IRIS (Incorporated Research Institutions for Seismology)**

<http://www.iris.edu/hq/audience/educators> A university consortium sponsored by the National Science Foundation that is dedicated to the operation of scientific facilities for the acquisition, management, and distribution of freely available seismic data. The site lists materials for Teaching About and Exploring Earthquakes, as well as Educational Opportunities, Materials, and Networking capabilities. The Slip-Stick model and activity were taken from this site.

**IRIS Education & Outreach “One-Pagers”** <http://www.iris.edu/edu/onepaggers.htm>

IRIS has created one-page handouts related to seismology for use in the classroom. These “one-pagers” are available upon request from IRIS headquarters or you can download Adobe Acrobat (.pdf) formatted copies of these high quality handouts from the site. IRIS, 1200 New York Ave. NW, Suite 800, Washington DC 20005. Phone: 202-682-2220 Fax: 202-682-2444.

**IRIS Educational Software**

[http://www.iris.edu/hq/programs/education\\_and\\_outreach/software](http://www.iris.edu/hq/programs/education_and_outreach/software) This web page lists many programs that can be used in the classroom, depending on the type of computer system you use. Select the one that applies to your needs.

**IRIS Videos**

[http://www.iris.edu/hq/programs/education\\_and\\_outreach/videos#N](http://www.iris.edu/hq/programs/education_and_outreach/videos#N) This web page lists the many videos available to be used in the classroom. They can be presented in YouTube or Quick Time formats. Some movies also have a PowerPoint component to them.

### **SCEC (Southern California Earthquake Center)**

<http://www.data.scec.org/Module/module.html> Investigating Earthquakes Through Regional Seismicity Education Module – Activities list. Section 1 “What is an Earthquake?” has fourteen activities to choose from. Section 2 “The Distribution of Earthquakes” has twelve activities. Section 3 “Measuring Earthquakes” has four activities to choose from. At the time of printing, this site section was still under construction.

**USArray** <http://www.usarray.org/edu/k12> In collaboration with the seismological and educational communities, the USArray Education and Outreach program develops and implements programs designed to enhance seismology and Earth Science education in K-12 schools, colleges and universities, and in adult education.

### **USGS (United States Geological Survey)** <http://earthquake.usgs.gov/earthquakes/>

The USGS has a website for earthquakes. This site has interactive maps of the latest earthquakes nationally and internationally. In addition, there are links to two different formats—a live feed (Atom XML) that monitors earthquakes and the Google Earth KML format. Both would be useful in the classroom. Within the USGS site, an [application](#) allows students and teachers to look at Probability Mapping for Earthquakes. All that is needed are [zip codes](#) of the state.

Another mapping option at the USGS site is the Interactive or Static [Fault Maps](#) for the state/s. Additional maps and tools can be found at the Online [Seismic Analysis Tools](#) site in the Earthquakes Hazards Program website (scroll down to the heading).

### **Virtual Earthquake**

<http://vcourseware4.calstatela.edu/VirtualEarthquake/VQuakeExecute.html>

A program developed by California State University LA (CSULA). Unlike most websites, Virtual Earthquake involves the students in an interactive simulation. Students will learn how to read seismograms and plot earthquake locations and magnitudes. They participate by estimating measurements on screen and inputting data. From their measurements and estimations, students will observe how earthquake locations and magnitudes are determined. If students make mistakes, they are allowed to go back and try again. Upon completion of the simulation, a personalized "certificate of completion" can be printed out and kept in the student's notebook or turned in for a grade as proof that they successfully completed the assignment.

### **Stop Disasters**

<http://www.stopdisastersgame.org/en/home.html>

This is an interactive disaster simulation game from the UN/ISDR International Strategy for Disaster Reduction. Teachers will want to select the **information tab** at the top to access additional resources or information. It is advisable for the teacher to play the game first to get an idea of how it works. The player selects from one of the five scenarios: wild fires, tsunamis, hurricanes, earthquakes or flood. They then select the difficulty level and read background information about the scenario. The players are given a specific amount of money and a maximum of 25 minutes to mitigate the hazard for the area. This game allows students to put

into practice the facts that they have been learning in the classroom about mitigation for disasters.

**The Interactive Game:** You can reduce human, physical, and financial catastrophe by making quick choices to plan and construct a safer environment, but you have limited funding. Expect good and bad advice along the way.

1. Go to [www.stopdisastersgame.org/en/home.html](http://www.stopdisastersgame.org/en/home.html) and touch **PLAY GAME > Launch game > Play game** (again)
  2. **Select a Scenario:** Type : **Earthquake** / Select: **SELECT DIFFICULTY LEVEL** (Start "EASY" to learn)
  3. Roll over each building to choose from Info, Develop or Demolish, and Defences or Upgrades. Each has a cost.
- WARNING:* 25 minutes goes by quickly. Fix big, older buildings first.