**ACTIVITIES**

 **(watch for descriptions and links to additional relevant**

**activities to be added through 2011)**

1. **Climate Change**

**1. Reconstruction of paleoclimates**

a. Ice Cores

The award winning online multimedia course, “The Habitable Planet,” includes an online textbook, videos, interactive labs, and a professional development guide for teachers (McGarry is one of six co-authors on this component). Unit #12 is on Earth’s Changing Climate (http://www.learner.org/courses/envsci/). The three essential questions in the introduction for this unit prompt students and all of us to think about why we care and need to know about the climate- past, present, and future, (<http://www.learner.org/courses/envsci/support/guide_unit12.pdf>):

1. What do we know about global climate changes over the course of Earth’s history?

2. What are the effects of global climate change on today’s world?

3. What does the future hold in terms of global climate change?

The professional development guide has directions for two activities appropriate for middle school students: *Historical Climate Statistics* (p. 6) and *Investigating Ice Cores* (p. 9) relevant to the topic of understanding past climate change and cooling periods. The first activity has students thinking about and looking at “the period from 1550 to 1700, referred to as the Little Ice Age, a period of particularly harsh climate conditions across most parts of the world believed to have been brought on by a combination of decreased solar activity and numerous large volcanic eruptions.” Students graph temperature data over time from the Little Ice Age, and then instructors are prompted to ask students to consider the causes of the observed cooling -volcanoes and other historical events. A comparison can be made between how volcanic eruptions and impacts of extraterrestrial objects induce climate change- both can cause ash to enter the atmosphere which blocks incoming solar radiation.

The second hands-on activity involves students working with actual ice cores -home grown and purposely “spiked” with ash and other signature features to be deciphered. Students should first watch the 45 minute video that introduces Dr. Lonnie Thompson and his work using ice cores from tropical glaciers to investigate past climate change. As students watch the video they should think about what we can learn about recent climate change from studying ice cores, and what is preserved in ice cores that reveals climate history? Then, as students identify and diagram the layers of ice in their group’s core they can correlate the presence of ash with natural events and ask where the ash came from and how did it get in the ice?

To modify the activity and make it appropriate to the Younger Dryas cooling event, the homemade ice cores can contain a colored layer (food coloring) to represent spikes of ammonium, believed to be a fingerprint for comets, which have been found in Greenland ice cores. Educational instructors and students can read a news article entitled, “New Evidence Of Ice Age Comet Found in Ice Cores” (Perkins, Sid; March 30, 2010, Science News, <http://www.wired.com/wiredscience/2010/03/new-new-evidence-of-ice-age-comet-found-in-ice-cores/>).