More than Mud; Exploring lake sediments in your own backyard
Lesson 3
Sediment Core Splitting and Description

Title: Mud in my Eyes - A first look at the sediment cores

In this lesson students will split the cores and take a first look at the sediments.

Completion Time:
- This activity will take 1 to 3 periods

Grade Level:
- Middle School and up

Overview:
After collecting sediment cores, from a lake or pond, in this activity the cores will be split (cut in half) and documented. Initial observations will be made regarding what is found. The core sample will be documented using both traditional written core description sheet and documentation on an excel core documentation file. Measurements of length and color will also be made.

Objectives:
Students will practice taking basic measurements (length) and learn procedure regarding careful and analytical documentation of observations and measurements.

Materials:
Safety goggles
Utility knife/box cutter
Dremmel tool (if using heavy lexan core liners)
Sodium poly acrylate (zorbitrol)
Clay wire cut-off tool
Metal or plastic scraper
Putty knife, plaster knife
Saran wrap
Digital camera
Core documentation sheet (paper and excel file)
Computer with MS Excel and NIH Image J

Lesson Preparation:
Number of cores collected will be important for this activity. Collaborative work is important for making careful observations. When starting to describe the cores, students should be in groups of two or three no larger than four. Since the cores will be split, plan for at Least one un-cut core for each 6-8 students.

If doing the electronic core documentation, download NIH Image J software on computers.

Procedure:
While sediment core tube is still capped, using a knife, puncture a small hole a few centimeters above the sediment water interface. Remove upper cap and drain excess water. Sprinkle a few grams of sodium poly acrylate in the core tube to absorb any remaining water from the top of the sample. When gel has formed, the core may be turned sideways and sediments will stay in position. Cut excess plastic from the length of the sediment core, then mark and cut the core in half along the long axis of the core.

If using heavy plastic core liners, cutting the core tube is best done with a dremmel tool with a cutting blade. (Be sure to use eye protection while using a rotary cutting tool.) If using thin polycarbonate liners, slit the core tube with utility knife or box cutter. Cut the sediments using a clay wire tool. A scraper, spatula, putty knife or wide plastering tool may be useful for separating core halves.

Using metal or plastic scraper (thin credit cards work well) in a sideways motion, carefully scrape the surface of the split core halves. This will clean the core half to reveal any layering that may have been disturbed when the core was cut with the wire tool.

In a well-lighted area (outside lighting works best) photograph the split and scraped cores.

Begin the process of core documentation using the core description sheet. Measure the length of the core. Indicate any change in lithology, describe any visible macro-fossils, measure the location of any visible change in the sediment and document on the core description sheet.

Introduce students to the Munsell soil color charts (Globe soil color charts work equally well) and have students carefully analyze the sediment color using the standardized hue, value, and chroma color identification chips. Document accordingly on the core description sheet.

Transfer documentation to excel

Resources:
Core splitting and initial documentation video
http://www.youtube.com/watch?v=xZRmdr6-9tw
Core description sheet .docx
Core description sheet .xlsx
Image J download
http://rsbweb.nih.gov/ij/download.html
See accompanying documentation for core documentation and image processing using Image J

Extension:
X-Ray your cores. This is a non-destructive technique that is often used to help see finer details and to see inside cores. (I taught a student whose father was an orthopedic surgeon. He quickly and happily agreed to X-ray the core samples for his daughter's class.)

Assessment:
Student core description sheets, excel core description files, or lab notebooks may be checked for completeness, understanding and careful documentation.

Students working on opposing halves from the same core sample may compare/contrast results.

Credits:

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Standards:

The list below includes some of the NGSS standards likely to apply to lessons from these activities

Middle school

MS-ESS1-4.	**Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used**
MS-ESS2-1.	**Develop a model to describe the cycling of Earth's materials**
MS-ESS2-3.	**Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales**
MS-ESS2-4.	**Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past**

High School

HS-ESS2-2.	**Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems**
HS-ESS3-5.	**Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.**