

## Climate Science Lessons Overview

### More than Mud - The story of sediment from an Arctic lake to a backyard pond.



#### Introduction

These activities are associated with the El'gygytgyn Drilling Project and are most helpful placed in context. In the winter of 2009, an international team of scientists traveled to the NE province of Chukotka, Russia to Lake El'gygytgyn to drill and extract the lake sediment cores. After preliminary studies, scientists discovered that Lake El'gygytgyn contained the longest undisturbed record of climate change anywhere in the continental Arctic. The '09 expedition extracted over 300 meters of sediment that recorded approximately 3.5 million years of climate history. Throughout the next several years scientists from around the world studied the sediment samples to reconstruct the climate history of this region of the Arctic.

Many attempts have been made to introduce middle and high school students to the concepts of climatology. Various simulation exercises have been developed to introduce the proxy concepts such as diatom and micro-fossil abundance. Rather than counting beads or colored candy; it is the strong belief of the researchers and educators associated with this expedition that the best way for students to understand the science of climatology is to DO climatology. In these lessons, students start by examining lake sediments from Lake El'gygytgyn in the Siberian Arctic, students then go on to discover that a climate signal is also being recorded in a lake or pond near their school.

Our goal is to train teachers and students to analyze real data and then use simple and inexpensive lake coring equipment to analyze their own local sediment cores. This draft includes four lessons and activities that have been classroom tested in Earth Science classes in several schools.

Lesson 1 – **More than Mud** – Analysis of data from Lake El'gygytgyn Russia. Using the large Lake E sediment core poster, students evaluate images and data from the Arctic expedition to Lake El'gygytgyn.

Lesson 2- **Let's Get Muddy** - Core acquisition. Students go on their own expedition to a local lake or pond to extract a sediment core.

Lesson 3 – **Mud in My Eyes** – Core description. Cores collected in lesson 2 will be split, examined, measured and described using standardized scientific procedures.

Lesson 4 – **Playing in Mud** – Core analysis. With careful analysis, various detailed properties of the core will be observed/measured leading students to discover climate information in the sediment.

When students collect, measure, describe and analyze sediment core samples from a local lake or pond, they become scientists as they evaluate samples to discover climatological information that has been preserved in the local sediment. As with doing any REAL science, the results will be somewhat unpredictable. Lessons are not fully comprehensive and outcomes will depend on your geographic area. Creative teachers will modify and adjust these lessons as necessary. Likewise assessments may vary from evaluation of graphs, lab reports, or oral collaborative discussions. Additionally they may be adapted to various courses and curricula.

The expedition to Lake El'gygytgyn and this paleoclimatology activity was made possible through generous contributions of members of the Lake El'gygytgyn scientific team— Special thanks to Dr. Julie Brigham-Grette (PI) of University of Massachusetts Funding for the expedition and research was provided by US National Science Foundation, Russian Academy of Science, German Research Foundation and Polar TREC. This lesson was written by Tim Martin, 2009 Polar TREC teacher and Earth Science teacher at Greensboro Day School. In the winter of 2009 Martin accompanied the Lake El'gygytgyn Drilling Project and has continued to work with members of the science team helping communicate the research to students and the general public.