

My NASA Data - GLOBE Connections

GLOBE Connections: Sea Level Rise

GLOBE protocols and learning activities that complement the Sea Level Rise phenomenon are outlined below.

Visit the [GLOBE Hydrosphere Protocols & Related ESDE Datasets](#) page that outlines the datasets available in the Earth System Data Explorer. These data complement student GLOBE investigations using the following protocols.

Sea Level Rise

As we explore sea level rise around the world, new questions arise. One such question is what is driving the regional differences in sea level rise. In some parts of the world sea levels are increasing, while in other parts of the world, sea levels are decreasing or remaining relatively constant, including, in recent decades, the California coast.

Glacier and land ice melt can also be regionally different. While the ice sheets of Greenland, Antarctica and most of the world's glaciers are melting, a distinction must be made between increased glacial discharge into the oceans due to global warming, a more permanent type of ice loss, and regional changes in the precipitation and evaporation that is feeding those glaciers and ice sheets, which vary regionally on the scale of decades.

Protocols

GLOBE protocols are used to collect data looking at factors that might contribute to sea-level rise. Students can implement the protocols to collect data and share their data with other GLOBE students around the world.

- **pH Protocol** - Students use either a pH meter or pH paper to measure the pH of water. If using the pH meter, the meter needs to be calibrated with buffer solutions that have pH values of 4, 7, and 10.
- **Salinity Protocol** - Students use a hydrometer to measure the specific gravity of the water sample, and use a thermometer to measure the temperature. With these two values, students will use tables to determine the salinity.
- **Water Temperature Protocol** - Students use a thermometer or probe to measure the temperature of the water.

Protocol Bundle

The ocean protocol bundles can complement explorations of sea level rise.

Ocean Protocol Bundle - Oceans are complex ecosystems, which implies that their study needs to take into consideration several interrelated physical parameters, not to mention the mechanisms and processes which reflect the interaction between land and oceans along coastal zones as well as the interaction between the atmosphere and oceans. This group of protocols is to be jointly implemented to improve our knowledge about oceans.

Learning Activities

Building a Thermometer



Purpose	To build an instrument that can be used to measure water temperature
Overview	
	Students will construct a soda-bottle thermometer, which is similar to the thermometer used by GLOBE schools. Both are based on the principle that most substances expand and contract as their temperature changes. This experiment also demonstrates the principle of heat transfer.
Student Outcomes	Student will understand why and how a standard thermometer works.
Science Concepts	
Physical Science	Substances expand and contract as they are heated and cooled.
Geography	The temperature variability of a location affects the characteristics of the physical geographic system.
Scientific Inquiry Abilities	Identify answerable questions. Design and conduct scientific investigations. Construct a scientific instrument. Develop explanations and predictions using evidence. Communicate results and explanations.
Time	Two class periods
	1. To do experiment - one class period
	2. To discuss principles of expansion, contraction, and heat transfer through conduction and convection - 15 to 30 minutes
Materials and Tools (per group of students)	Ice Water One liter plastic soda bottle Clear or white plastic drinking straw Modeling clay. A one-pound block of modeling clay should be enough for 25 to 30 thermometers Two 2-liter plastic soda bottles – the tops of these bottles need to be cut off Scissors or knife to cut the top off the 2-liter plastic bottles Food coloring (yellow does not work as well as red, blue, and green) A watch or clock with a second hand A metric ruler A marker, grease pencil, or pen to mark the side of the straw <i>Building a Thermometer Activity Sheet</i>
Preparation	Assemble materials. Review principles of heat transfer.
Prerequisites	Ability to make a graph



Source: [GLOBE Website](#)

Building a Thermometer: Students construct a soda-bottle thermometer, which is similar to the thermometer used by GLOBE schools. Both are based on the principle that most substances expand and contract as their temperature changes. This experiment also demonstrates the principle of heat transfer. The thermometer can be used to measure water temperature.