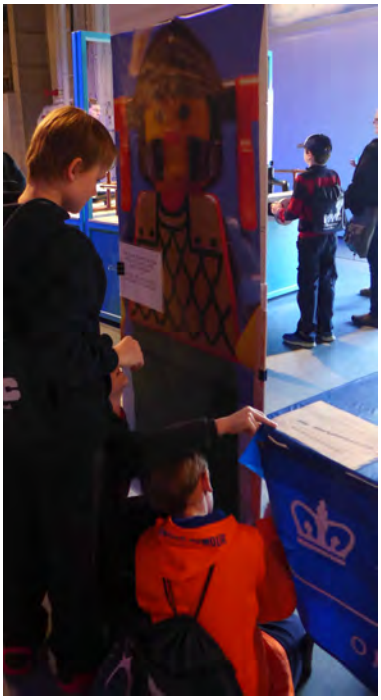
SEA LEVEL ACTIVITY 4

PREDICTIONS: HOW MUCH WILL SEA LEVEL RISE (SLR) IN THE NEXT 100 YEARS?



Background Summary: Sea level has changed over the last 100 years. We can use tide gauges to tell how much it has changed, and to think about what might happen to sea level in the next 100 years. Why is it changing? As climate has warmed the ocean water has warmed causing it to expand and take up more space (thermal expansion), and glaciers and ice sheets around the world have been melting, causing sea level in most places to rise. Scientists have been studying this and are predicting that the global sea level will continue to rise over the next 100 years as ocean water continues to warm and glaciers and ice sheets continuing to melt. But how much?

Goals: Engage students with data. Encourage students to connect with existing data from tide gauges from our local shorelines to see what has happened with sea level. Additionally to connect students with what scientists are predicting through the Intergovernmental Panel on Climate Change (IPCC) report, and encourage them to build their own predictions from data

Materials:
At home alternatives noted in italics

- 6 foot tall poster (see image above and below)
  Alternative: Use butcher paper– have student lie down on paper and draw and outline around them – label height of student on sketch for scale. To make a 6 foot tall poster of a person (we chose a Lego person!), take a high resolution photo, blow it up to the correct proportions, and print it at local office supply store.
  No poster paper? Mark 6 ft on your wall with a pencil or painter's tape and continue the activity with on your wall using pencils, tape or stickers. Remove when finished!
- Yard or meter stick
- Copy of past 100 year SLR graph for the local area (we included NYC on page 3)
- sea level rise NOAA tide gauges
- May wish to print the graph below from the IPCC report
- Stickers
- Marker pens

Set Up:
Mount the image you are using on mat board so that is it rigid, or tack it up against a hard surface. Use the meter stick to draw a line across the poster at the height that sea level has

risen in in the last 100 years for your area. Next tape the meter stick along the edge of the poster so that students can use it in their predictions for sea level rise.

Next mark the IPCC predictions on the poster. You may choose to show each of the different IPCC predictions or just a low and high range (graph page 4).

Print out a copy of the NOAA tide gauge data for the last 100 years for your area (sample attached below). Click on the arrow for your area and the graph will appear.
https://tidesandcurrents.noaa.gov/sltrends/sltrends.html

Activity:

Students are asked to make predictions. They should consult with the local area SLR graph from NOAA tide gauges that you have printed out, and consider the IPCC predictions that are marked on the poster. They should label their prediction stickers with their initials as they place them on the poster.

Discussion:

1) This 6 ft. tall print out of a Lego Person is a size marker for a person. You can see how much water has risen at our waterfront in the past 100 years. You can also see what a group of scientists believe is possible in the next 100 years.

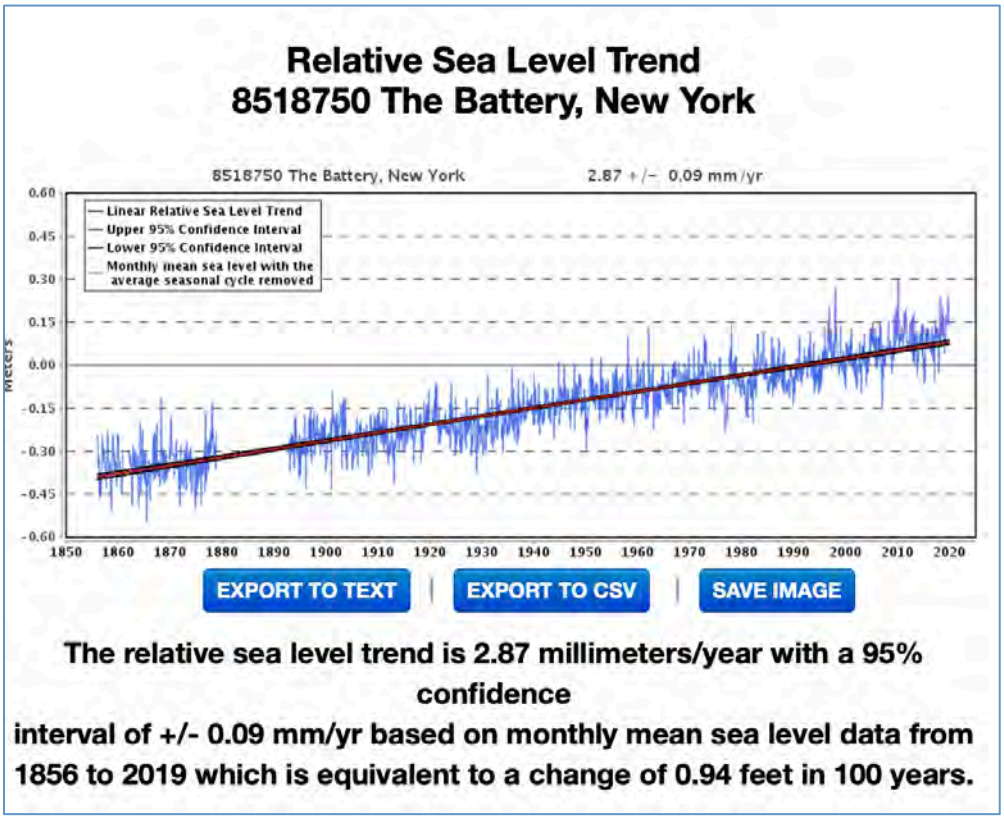
2) What do you think might happen in the future? Students will start from the bottom of the person as this is a new measurement NOT cumulative. **They are predicting a rate of change NOT a total change through time.** Once the students have placed their initials on a sticky on the Lego-person predicting SLR in their area over the next 100 years, ask them to either explain their choice to the group or write a sentence or two explaining their logic.

3) Remind them that for the rates to slow from the amount that sea level has risen the last 100 years it would mean the temperature would have to DROP quite a bit as there is a lot of heat already in the ocean.

4) As a class, you can discuss the concept of linear projections, feedbacks that can influence and accelerate processes, parts of the system that are not yet clearly understood etc.

5) As a group, take the responses and graph them to see how they fall. Use this to launch a discussion about: predictions and their use; was there any type of consensus; what are some of the challenges in doing predictions around SLR.

Note: This activity ties well into all the earlier activities: the "Oceans Connect Us All to the Ice in the Polar Regions" on how water in the hydrosphere moves between a liquid state in the oceans and a frozen state in the ice sheets, to the "Just How Much Ice is There in the Polar ice Sheets" which looks at where the potential for a rise in sea level is, and "Time Traveling With Sea Level" that looks at variations in sea level through different geologic time periods.



IPCC 5th Report issued 2013 – findings for global Sea Level Rise (SLR) by 2100 (~30 cm in a foot – so we are looking at 1-3 ft. of possible SLR)

Let us jump straight in with the following graph which nicely sums up the key findings about past and future sea-level rise: (1) global sea level is rising, (2) this rise has accelerated since pre-industrial times and (3) it will accelerate further in this century. The projections for the future are much higher and more credible than those in the 4th report but possibly still a bit conservative, as we will discuss in more detail below. For high emissions IPCC now predicts a global rise by **52-98 cm** by the year 2100, which would threaten the survival of coastal cities and entire island nations. But even with aggressive emissions reductions, a rise by **28-61 cm** is predicted. Even under this highly optimistic scenario we might see over half a meter of sea-level rise, with serious impacts on many coastal areas, including coastal erosion and a greatly increased risk of flooding.

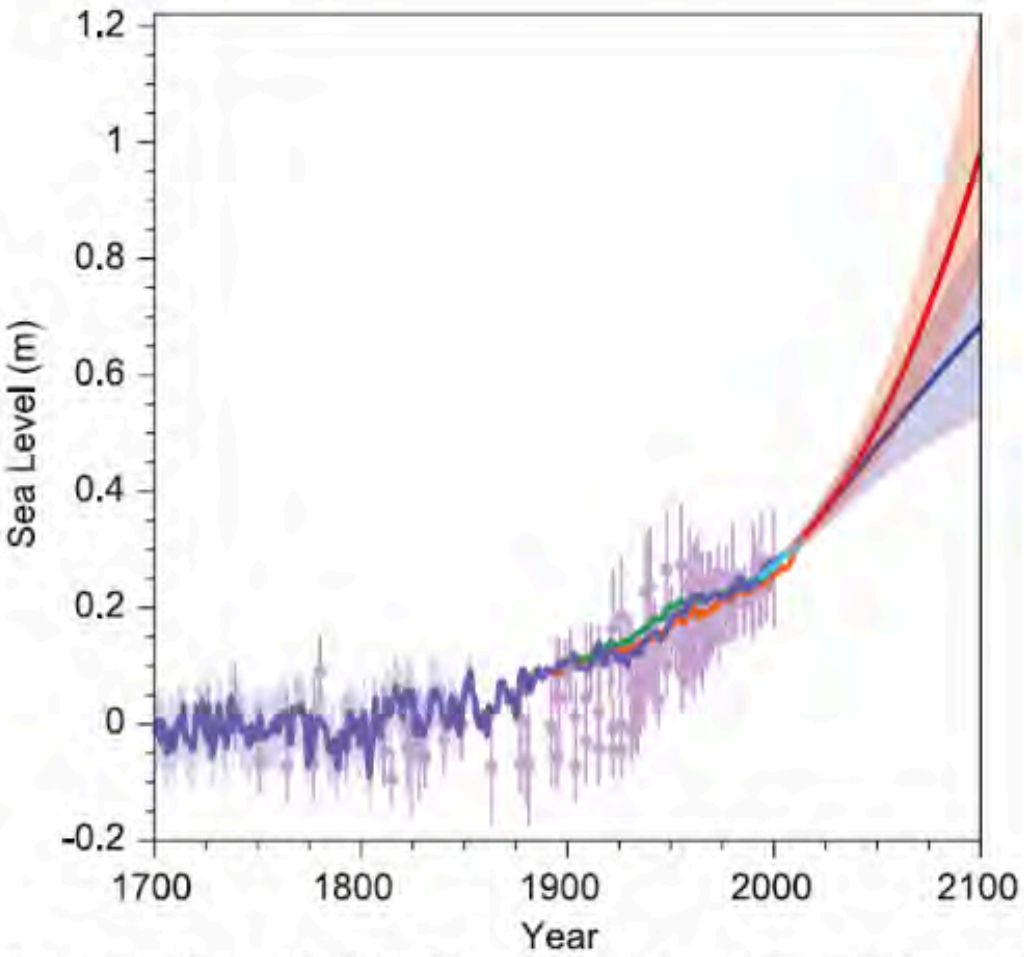


Fig. 1. Past and future sea-level rise. For the past, proxy data are shown in light purple and tide gauge data in blue. For the future, the IPCC projections for very high emissions (red, RCP8.5 scenario) and very low emissions (blue, RCP2.6 scenario) are shown. Source: IPCC AR5 Fig. 13.27.