Texas Shoreline Change Exercise

BUREAU OF ECONOMIC GEOLOGY

TEXAS Geosciences
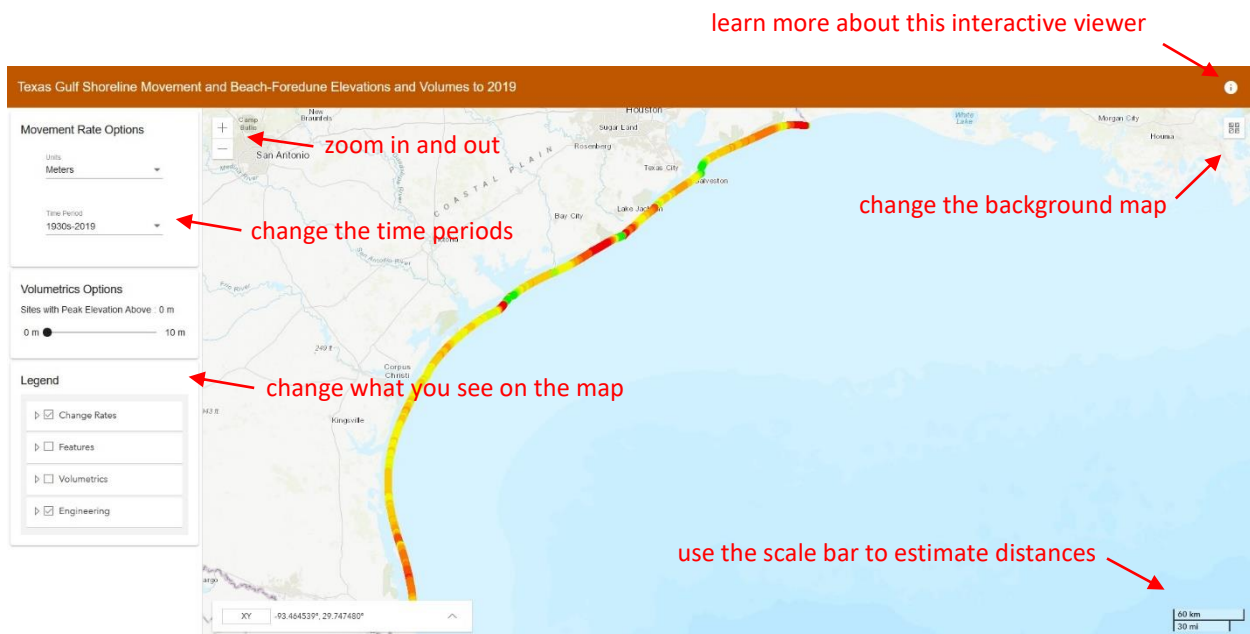*Bureau of Economic Geology*
Jackson School of Geosciences
The University of Texas at Austin

The Gulf of Mexico shoreline of the Texas coast is constantly changing. Shoreline retreat, where the shoreline is moving landward over time, is occurring along 80% of the Texas Gulf coast. Since the 1930's, this has resulted in an estimated 6,627 ha (16,375 ac) of land loss. For this exercise, you will be learning about the Bureau of Economic Geology's **Texas Shoreline Change Project** and use the **interactive Texas Gulf Shoreline Movement tool** to answer questions about why we study and who might be interested in learning about shoreline movement and compare rates of movement, dune height, and sediment volume in the beach dune system along different segments of the Texas coast.

Background information about the Texas Shoreline Change Project can be found at the following address: **https://www.beg.utexas.edu/research/programs/coastal/the-texas-shoreline-change-project**. From this site you can download the latest shoreline movement **report** to learn more about how we calculate rates of shoreline movement, what sources of data are used to determine shoreline position, and read an in depth analysis about shoreline movement and beach and dune volumetrics along the Texas Gulf coast. The interactive shoreline movement viewer can be found here: **https://coastal.beg.utexas.edu/shorelinechange2019/**. Take a few moments before answering the questions below to explore these sites and to familiarize yourself with the interactive map and how to navigate within the viewer.

learn more about this interactive viewer

zoom in and out

change the time periods

change the background map

change what you see on the map

use the scale bar to estimate distances

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1. Before you begin your exploration of the interactive shoreline change map, think about why we want to know at what rate shorelines change? Who would benefit from this information and why?

2. Can you think of reasons why the shoreline might change over time? Long- and short-term? Natural and man-made? Keep your answers ready to use for later questions.

3. Look at the time period options: 1930s to 2019, 1950s to 2019, and 2000 to 2019.

   a. How do you think shoreline position was measured in the 1930s, 1950s, 2000, and 2019? How has determining the position of the shoreline changed? What tools or techniques do scientists use?
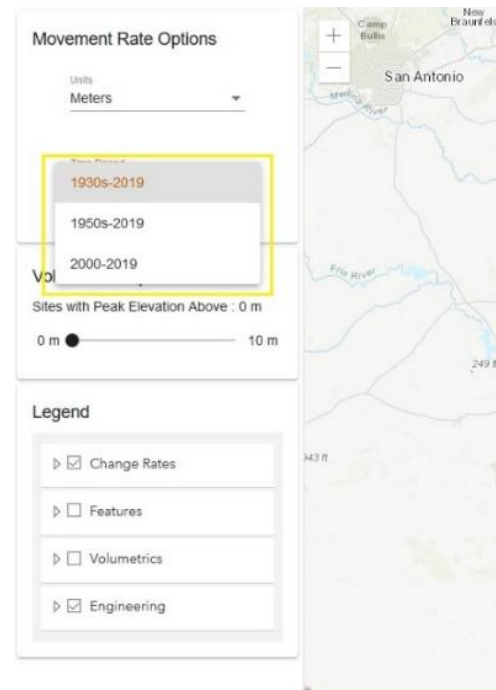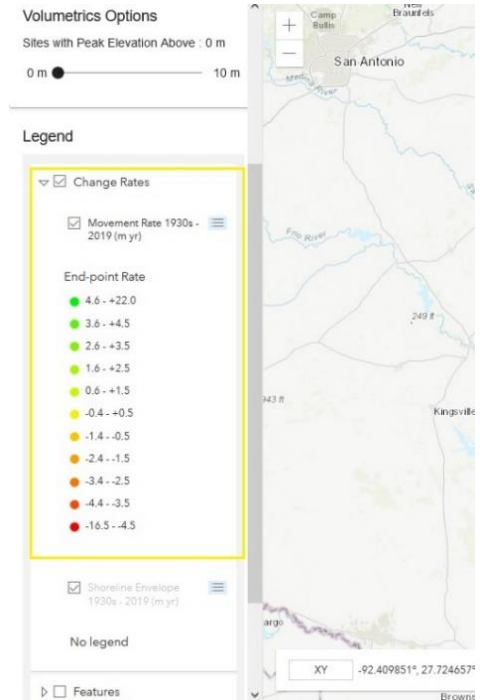
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4. Choose one of the time periods and zoom out to look at the entire Texas coast.

   a. What colors in the legend represent shoreline advance or retreat?

   b. Are there more areas of retreat or advance along the Texas coast? Are they located along same stretches of the coast or distributed everywhere?

   c. Where do you find the most shoreline retreat? Where do you find the most shoreline advancement? Do those areas have anything in common?

   d. Find the areas along the Texas coast that have structures, beach nourishment, or dune restoration projects. Where are they located? How does the shoreline change in those areas?
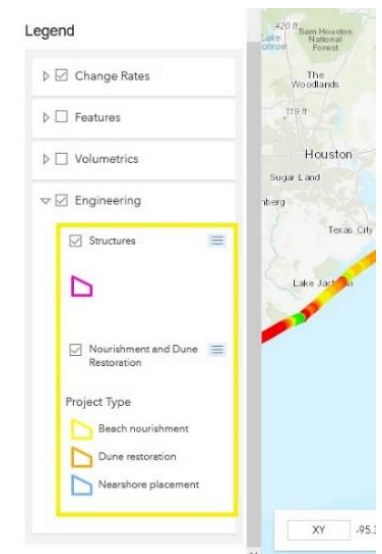
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e. Change the background map to investigate some of those areas further.
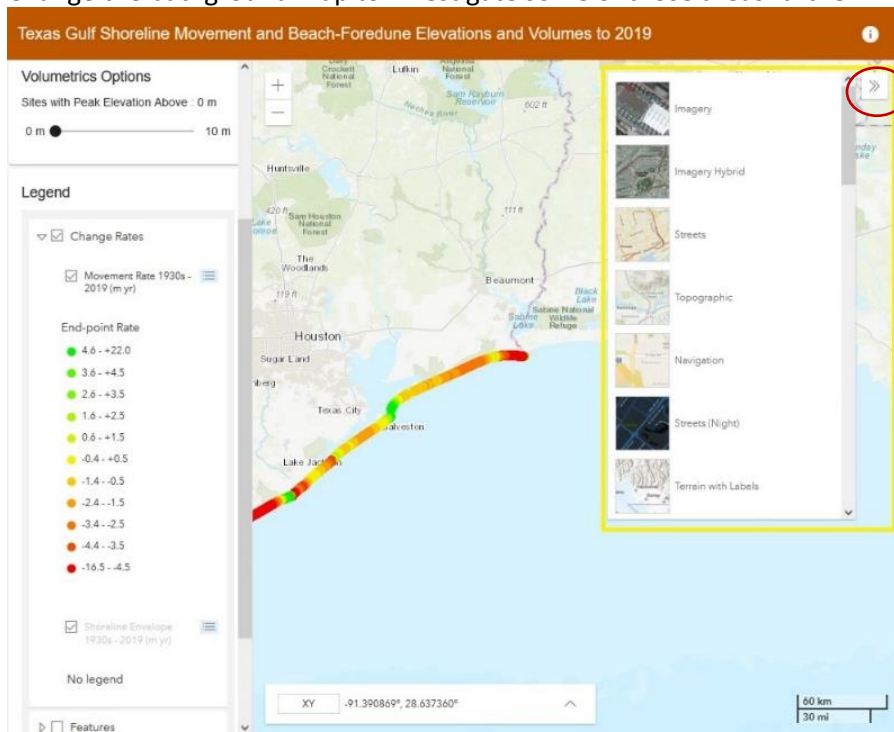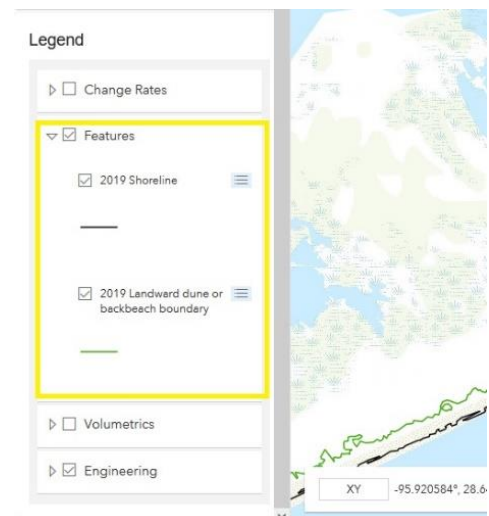

Use the imagery or community maps to find out about developments, buildings, roads, or other infrastructure. Use the topographic or terrain maps to explore how elevation impacts shoreline change. Which background maps show man-made structures like jettys or seawalls? Which highlights natural features such as tidal passes (breaks between islands), river channels and mouths, and marshes? Could those features influence shoreline change, and how? How do your findings compare to your answers from #2 above?

5. Switch back and forth between the three time period options.

    a. How do they compare? Are the trends (retreat/neutral/advance) in shoreline change the same for different areas? Have the rates changed over time?

    b. Try to find an area with a trend reversal (from positive to negative shoreline change or vice versa) over the different time periods. Can you think of reasons why that would happen?

6. Pick three sections of the coast: 1 with shoreline advancement, 1 with shoreline retreat, and 1 with very little shoreline change (stable). Make sure to note which time period you are observing.

    a. Look at the width of the beach (the difference between shoreline position and landward dune boundary). You can toggle these on and off under Features in the Legend. Which areas have the narrowest beaches? Which areas have the widest? Does that correlate with retreat or advancement of the shoreline?

b. What do peak dune elevation and normalized alongshore volume mean? Why is that data important? Is there a correlation between the two? How does it compare to shoreline change?
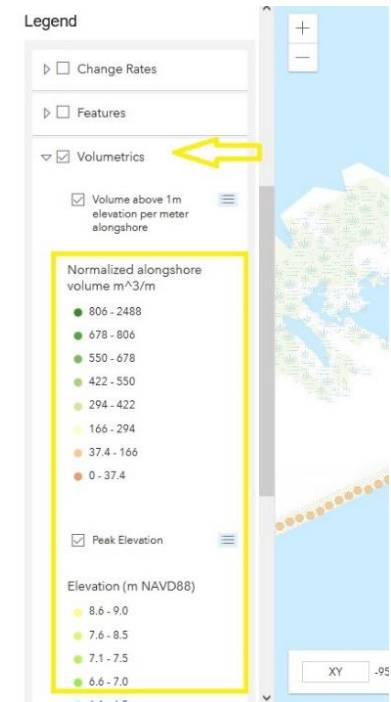
7. Zoom in to the part of the coast closest to your home or school or a place on the Texas coast that you like to visit.

   a. How is the shoreline changing here? Check all three time periods and compare.

   b. Use the scale bar in the lower right corner to estimate how wide the beach is. Where are the widest and narrowest parts of your beach? How big is the difference? Can you think of reasons for those differences?

   c. Look at the elevations. How do they compare to the rest of the coast?

   d. Are there any structures, nourishment activities, or dune restoration projects at your beach? If yes, do the shoreline change, beach width, elevations, and volumes look different at your select beach than in nearby locations without those activities?