

## Overview:

Students locate their community and create polygons in Google Earth to determine what areas would be affected at different runup levels.

## Objectives:

The student will:

- put “Placemarks” of emergency locations in Google Earth;
- customize the placemarks; and
- add descriptions to placemarks

## Materials:

- STUDENT WORKSHEET: “Visualizing Tsunami Runups with Google Earth”
- Computer with Internet access and Google Earth installed (NOTE: Google Earth may be installed for free at <http://earth.google.com>)

## Activity Preparation:

1. If it is not already installed, download and install the program Google Earth for each computer. It is available at <http://earth.google.com>. Download the appropriate version for the operating system on which the program will be installed. Double click on the Google Earth icon to launch the program.
2. Students should be familiar with using Google Earth. They should be able to zoom in/out, move and tilt the image. If students are not familiar with Google Earth, have students do the Grades 5 - 8 “Google Earth” lesson before doing this lesson. It can be downloaded at <http://www.aktsunami.com/lessons/GITExercises.html>.
3. KMZ files of communities in southern Alaska are available on the ATEP website. The files should be added to Google Earth before completing the lesson. Google Earth updates its imagery regularly, so check to see whether the ATEP website or Google Earth has the most current imagery. To download the KMZ files, click the **Student Resources** button on the ATEP website at <http://www.aktsunami.com>, then go to **Satellite Imagery** to download the KMZ file for your community. The file will open in Google Earth.
4. The units used for elevation in this lesson are meters. To change the elevation to meters in Google Earth go to **Tools → Options** and select the **3D View** tab. Select the **Meters, Kilometers** button in the Show Elevation section.

## Activity Procedure:

- 1) Ask students how far water would go into the community if a tsunami with a 2-meter runup were to strike. Ask how far it would reach if the tsunami had a 6-meter or 10-meter runup.
- 2) Introduce the lesson by explaining that polygons will be created in Google Earth to demonstrate the area covered for a tsunami with a 2-, 6- and 10-meter runup. If available, use a projector to demonstrate the procedure using the Sand Point, Alaska, example as described in the STUDENT WORKSHEET.

- 3) Hand out the STUDENT WORKSHEET: "Visualizing Tsunami Runups with Google Earth." Have students launch Google Earth and complete the activity for their community.

(NOTE: The resolution of the elevation data used in Google Earth varies across the globe. In the Lower 48, it ranges from 3 meters to 30 meters. In Alaska the resolution is 60 meters. The elevation accuracy of the polygons created in this exercise likely will vary from the elevation readings given on a GPS. Google Earth updates its data regularly, so future updates may provide more accurate elevations as data becomes available.)

### Extension Idea(s):

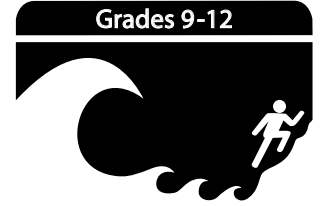
Students create a document with the information of the emergency locations and telephone numbers to be taken home and shared with their family.

### Answers:

- 1) Answers will vary.
- 2) Answers will vary.
- 3) Answers will vary.
- 4) Answers will vary.
- 5) Answers will vary.

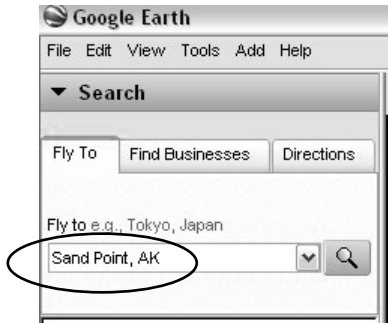
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# Student Worksheet (page 1 of 3) Visualizing Tsunami Runups with Google Earth



### STEP 1:

Launch Google Earth and type the name of your community in the search box. Click on the magnifying glass or press return.



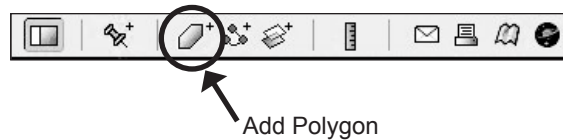
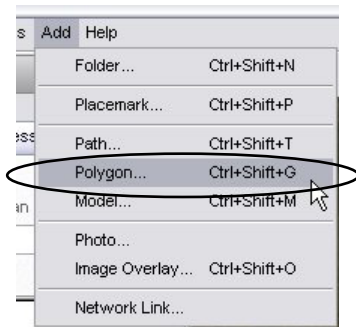
### STEP 2:

Use the zoom in/out tool so a large area around the community is visible in the window.



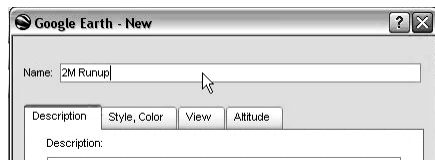
### STEP 3:

On the menu use the **Add → Polygon**, or click the **Add Polygon** icon from the toolbar.



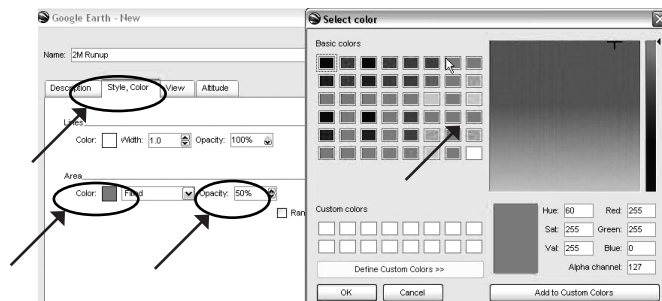
### STEP 4:

In the **Name** box type "2M Runup."



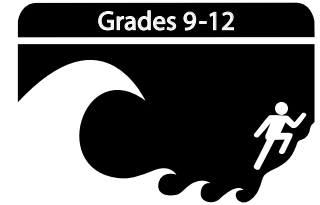
### STEP 5:

- 1) Click on the **Style, Color** tab.
- 2) Double click on the **Area** color box.
- 3) Select a yellow color and click **OK**.
- 4) Lower the **Opacity** to 50%.



Name: \_\_\_\_\_

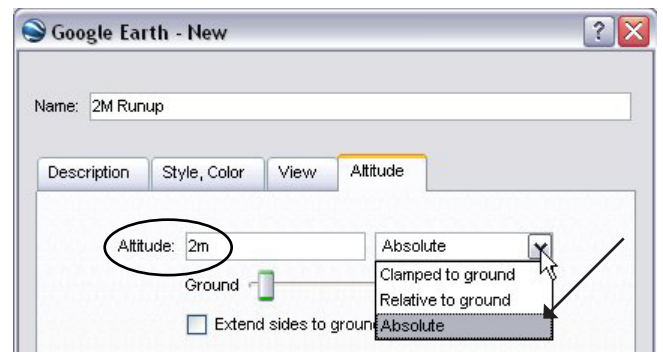
# Student Worksheet (page 2 of 3) Visualizing Tsunami Runups with Google Earth



STEP 6: In the Google Earth window, start the polygon by clicking a point that is in the ocean and away from the community. Continue clicking points to make a polygon that completely covers the community.

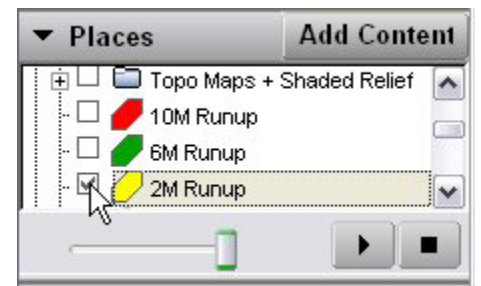


STEP 7: Click on the **Altitude** tab in the "2M Runup" polygon window. Enter "2m" in the Altitude box and select **Absolute** from the drop down menu. Click **OK** when finished.



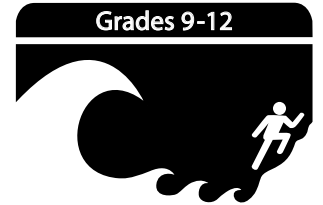
STEP 8: Repeat steps 3 through 7 to make two more polygon layers that are the same size as the first one. Make a green polygon at the 6m level that has a 50% opacity and another at the 10m level that is red with a 50% opacity.

STEP 9: In the Places sidebar click on the **2M Runup** layer while the other two (6M & 10M) are off. Zoom in, tilt, and move around the image to see what areas of the community would be covered with a 2m runup.



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# Student Worksheet (page 3 of 3) Visualizing Tsunami Runups with Google Earth



STEP 10: Click the 2M polygon off and click on the 6M to see the difference in the areas that would be covered. Do the same for the 10M runup.

Analyze the areas covered at the different levels by comparing them to the coast or a building.

Example: View the areas inundated by comparing them to the building in the circle.



2m runup



6m runup



10m runup

Answer the following questions.

A. Would the airport runway be covered at the 2m, 6m or 10m runup level?

\_\_\_\_\_ M runup level

B. Would any schools be inundated by a 2m, 6m, or 10m runup? (Circle one)

2m runup:     yes no  
6m runup:     yes no  
10m runup:    yes no

C. What is the elevation of the school? (Hint: with the mouse cursor over the school, look at the bottom of the Google Earth window.)

\_\_\_\_\_

D. Are there any houses that would be reached by a tsunami with a 2m runup? (Circle one)

yes no

E. What areas are primarily affected by a 2m runup? (i.e., harbor, cannery, parking lots, houses)

\_\_\_\_\_  
\_\_\_\_\_