Dynamic Earth Volcano Lab - Google Earth™ Name: _____

Goal: *To be able to describe and identify the common volcano types, and relate volcano types with associated volcanic hazards, tectonic setting, and geographic location.*

Volcano shape is strongly controlled by eruptive style, which in turn is controlled by magma composition and tectonic setting. This lab is intended to give you the opportunity to examine volcanoes from around the globe, and to interpret the tectonic settings in which they form. To learn more about volcanoes, check out the following websites: the Smithsonian Institution Global Volcanism Program: http://volcano.si.edu/, Volcano World: http://volcano.oregonstate.edu/; USGS Volcanic Hazards Program http://volcanoes.usgs.gov/.

Volcanoes!

1. **Navigate to Chile, in South America** (you can go directly there by typing in the coordinates in the search bar at the upper left side of the screen -33.25, -70.35). Center the image so that the capital, Santiago, is in your screen at an eye altitude of ~1000 km (the names of the capitols will appear as you zoom in). Make sure that north is at the top of the image.

2. Tilt the image so that you can look northward along the South American coast. Briefly describe the major tectonic features (landforms) that you see.

3. Now navigate to Descabeza (you can go directly there by typing in the coordinates in the search bar at the upper left side of the screen -35.58, -70.75).

a) *Describe* the size and shape of the volcano by filling in the spaces, below:

Maximum height (elevation) of the volcano above sealevel: _____ meters.

Base elevation of the volcano: _____ meters.

Relief (maximum elevation – base elevation) = _____meters total height.

Base width: _____ meters. Average slope of volcano ((relief ÷ ½width)*100%):_____

b) *Sketch and describe* the overall *shape* of Descabeza.

c) Describe the likely composition (mafic, intermediate, felsic) of this volcano, based on your *observations*. Explain your answer.

d) Describe the major geologic hazards associated with this volcano. What do the deposits look like for each hazard, and what specific areas of the landscape are most impacted by each hazard?

e) Zoom out and examine the region. Describe the likely tectonic setting of the volcanoes of the Andes mountains (crust types and relative motion). Hint: is there a deep ocean trench to the west of the mountains?

f) After the lecture on volcanoes, speculate on the volcano type, based on size, shape, and composition.

4. Navigate to Mt. St. Helens (46.1958, - 122.1821) **in southern Washington, USA.**

a) Maximum height (elevation) of the volcano above sea level: _____ meters.

Base elevation of the volcano: _____ meters.

Relief (maximum – base elevation) = _____meters total height.

Base width: _____ meters. Average slope of volcano ((relief ÷ ½width)*100%):_____

b) *Sketch and describe* the overall *shape* of Mt. St. Helens:

c) Describe the likely composition of this volcano, based on your *observations*. Explain your answer.

d) Describe the major geologic hazards associated with this volcano. What do the deposits look like for each hazard, and what specific areas of the landscape are most impacted by each hazard?

e) Zoom out and examine the region. Are there any other volcanoes nearby? Describe the likely *tectonic setting* of the volcanoes of the Cascade Range. Support your answer with observations on the major tectonic landforms of the region.

f) After the lecture on volcanoes, speculate on the volcano type, based on size, shape, and composition.

5. Navigate to Mauna Loa on the BIG island of Hawaii (central Pacific Ocean) (19.4715, -155.59039).

a) Maximum height (elevation) of the volcano: _____ meters above sea level.

Base elevation of the volcano: _____ meters above sea level.

Relief (maximum – base elevation) = _____meters, total height.

Base width: _____ meters. Average slope of volcano ((relief ÷ ½width)*100%):_____

b) *Sketch and describe* the overall *shape* of Mauna Loa.

c) Describe the likely composition of this volcano, based on your *observations*. Explain your answer.

d) Describe the major geologic hazards associated with this volcano. What do the deposits look like for each hazard, and what specific areas of the landscape are most impacted?

e) Zoom out and examine the region. Describe the likely tectonic setting of the Hawaiian Islands. (Hint: think back to your tectonic homework). Support your answer with observations on the major tectonic landforms of the region.

f) After the lecture on volcanoes, speculate on the volcano type, based on size, shape, and composition.

6. Navigate to Mt. Fujiyama, Japan (35.364, 138.731).

a) Maximum height (elevation) of the volcano above sealevel :_____ meters.

Base elevation of the volcano: _____ meters.

Relief (maximum – base elevation) = _____meters total height.

Base width: _____ meters. Average slope of volcano ((relief ÷½width)*100%) = _____

b) *Sketch and describe* the overall shape of Mt. Fujiyama:

c) Describe the likely composition of this volcano, based on your *observations*. Explain your answer.

d) Describe the major geologic hazards associated with this volcano. What do the deposits look like for each hazard, and what specific areas of the landscape are most impacted? How do the volcanic *risks* here compare with those around Mt. St. Helens? Begin by defining *volcanic risk*, then compare the two locations.

e) Zoom out and examine the region. Describe the likely tectonic setting of the volcanoes in Japanese region. Support your answer with observations on the major tectonic landforms of the region.

f) After the lecture on volcanoes, speculate on the volcano type, based on size, shape, and composition.

7. Navigate to Mt. Alayta, Ethiopia (12.887, 40.573).

a) Maximum height (elevation) of the volcano above sea evel :_____ meters.

Base elevation of the volcano: _____ meters.

Relief (maximum – base elevation) = _____meters total height.

Base width: _____ meters. Average slope of volcano ((relief ÷ ½width)*100%):_____

b) *Sketch and describe* the overall shape of Mt. Alayta:

c) Describe the likely composition of this volcano, based on your *observations*. Explain your answer.

d) Describe the major geologic hazards associated with this volcano. What do the deposits look like for each hazard, and what specific areas of the landscape are most impacted?

e) Zoom out and examine the region. Describe the likely tectonic setting of the volcanoes in the region (crust type and motion). Support your answer with observations on the major tectonic landforms of the region.

f) After the lecture on volcanoes, speculate on the volcano type, based on size, shape, and composition.

8. Navigate to Aniakchack, Alaska (56.901, -158.142).

a) Maximum height (elevation) of the volcano above sea level :_____ meters.

Base elevation of the volcano: _____ meters.

Relief (maximum – base elevation) = _____meters total height.

Base width: _____ meters. Average slope of volcano ((relief ÷ ½width)*100%):_____

b) *Sketch and describe* the overall shape of Aniakchack:

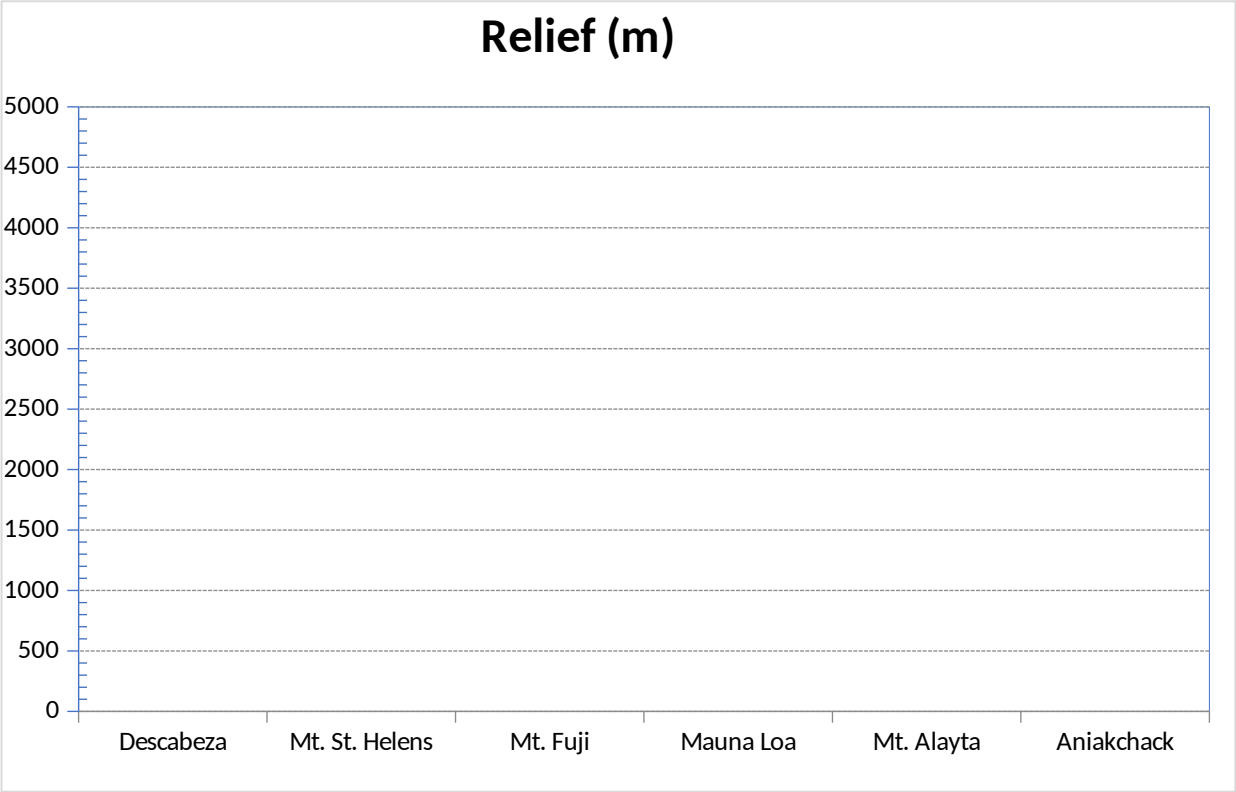
c) Describe the likely composition of this volcano, based on your *observations*. Explain your answer.

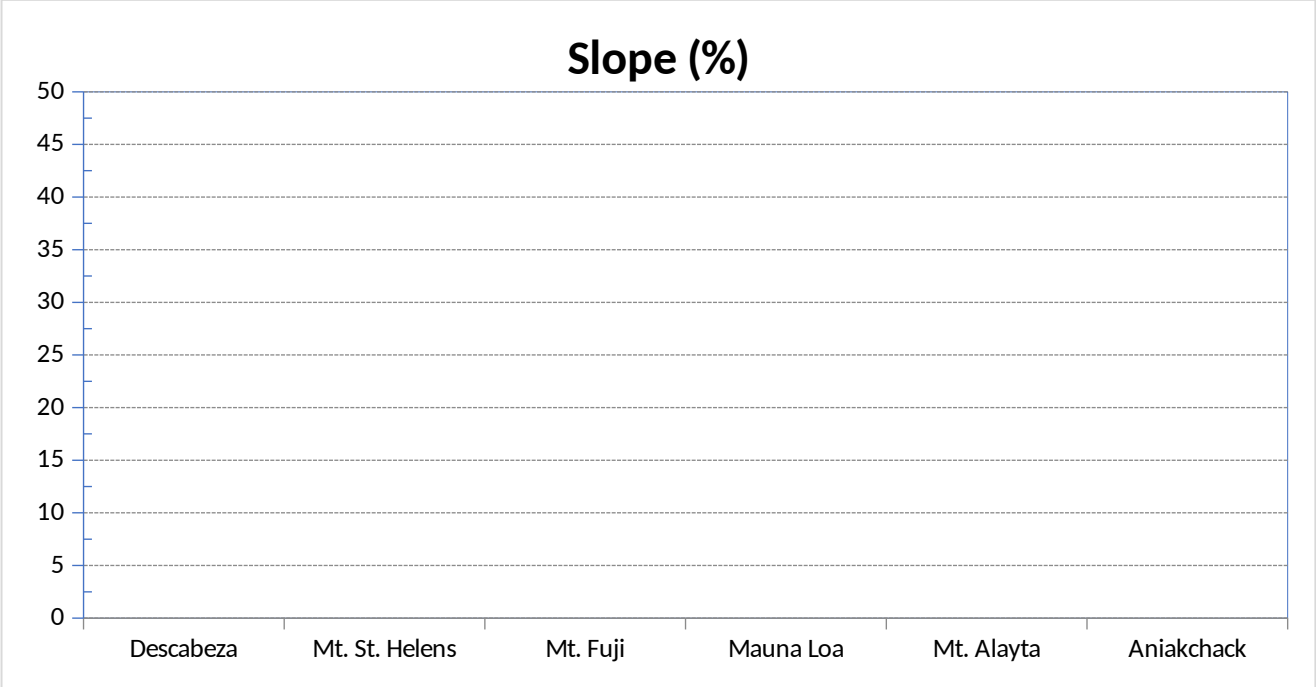
d) Describe the major geologic hazards associated with this volcano. What do the deposits look like for each hazard, and what specific areas of the landscape are most impacted?

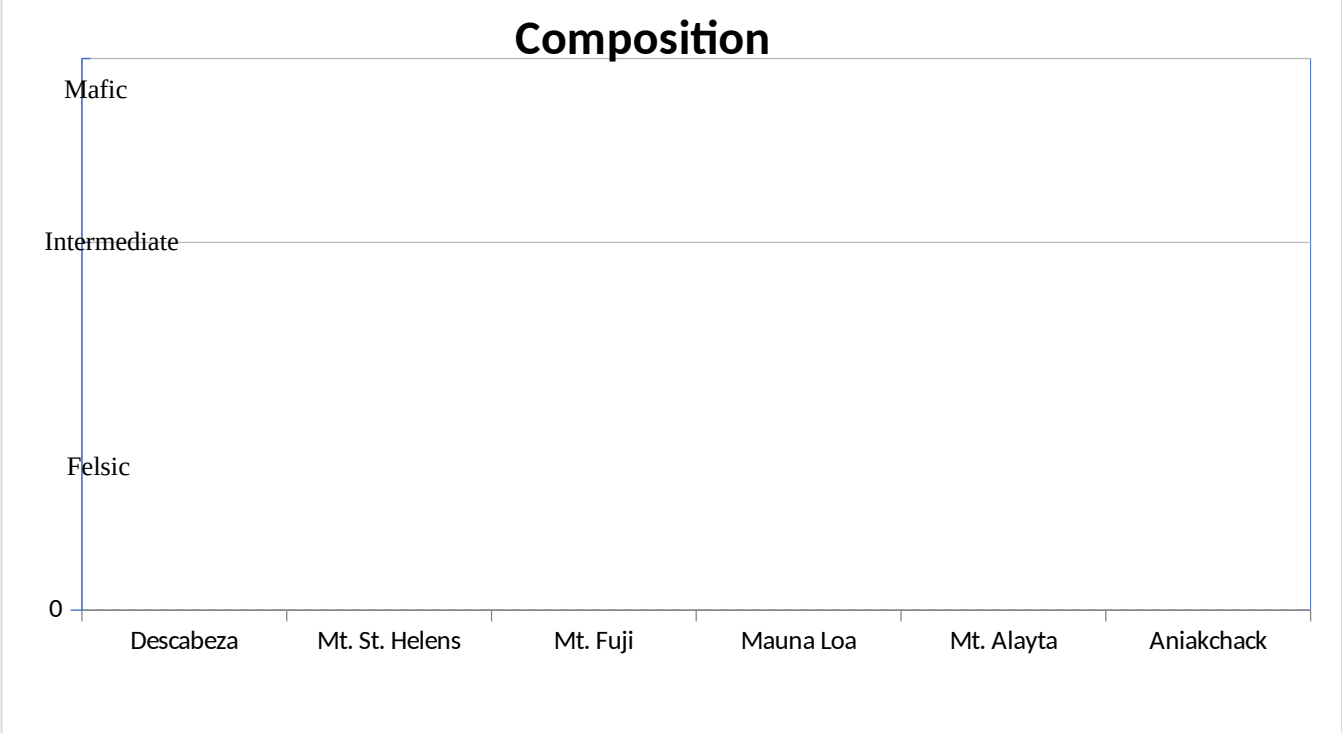
e) Zoom out and examine the region. Describe the likely tectonic setting of the volcanoes in the region (crust type and motion). Support your answer with observations on the major tectonic landforms of the region.

f) After the lecture on volcanoes, speculate on the volcano type, based on size, shape, and composition.

9. Plot your measured values for the volcanoes examined in this lab, on the graphs below.




Slope (%)
50
45
40
35
30
25
20
15
10
5
0
Descabeza
Mt. St. Helens
Mt. Fuji
Mauna Loa
Mt. Alayta
Aniakchack


Composition
Mafic
Intermediate
Felsic
0
Descabeza
Mt. St. Helens
Mt. Fuji
Mauna Loa
Mt. Alayta
Aniakchack

Summarize volcano type/composition relationships.

Go back to your answer for question 'f' for each volcano examined in lab, and make sure you have a good answer! Then use your observations and interpretations to complete the following statements and questions. Use Tables 1-3, on the next page, for appropriate terms.

- **Shield** volcanoes usually have a_____ shape, _____slope, and a _____composition. The most common hazard(s) are:

  - Shield volcanoes commonly form in these tectonic settings:

    Explain your answer (relate volcano type to magma composition – where does the magma come from?)

- **Composite** volcanoes usually have a_____ shape, _____slope, and a _____composition. The most common hazard(s) are:

  - The most common tectonic setting of composite volcanoes is at: _____boundaries.
    Explain your answer (relate volcano type to magma composition – where does the magma come from?)

- **Caldera** volcanoes usually have a_____ shape, _____slope, and a _____composition. The most common hazard(s) are:

  - Caldera volcanoes commonly form in these tectonic settings:

    Explain your answer (relate volcano type to magma composition – where does the magma come from?)

Table 1

Shapes
Wide dome
Steep cone
Open crater with raised rim

Table 2

Slopes
Low (0 – 10 %)
Moderate (11 – 20%)
Steep (>20%)

Table 3

Composition
Mafic
Intermediate - Felsic
Felsic