Team Number _____

This is the Dynamic Planet (Earthquakes and Volcanoes) test for Division B.

You may divide up the test, but if you do, please put your team number on every page.

The tiebreakers on this test are

1. The total score on Section A (the short answer section)
2. The score/completeness of answer on problem B.1.
3. The total score on Section D
4. The total score on Section E

Thank you for putting in the time to learn about this field. I hope that you find this test challenges you to put what you've learned into context.

Good luck!

Scores:

_____ A (30 points)

_____ B (20 points)

_____ C (20 points)

_____ D (20 points)

_____ E (10 points)

_____ TOTAL

A. Identification/Short answer (5 points each)

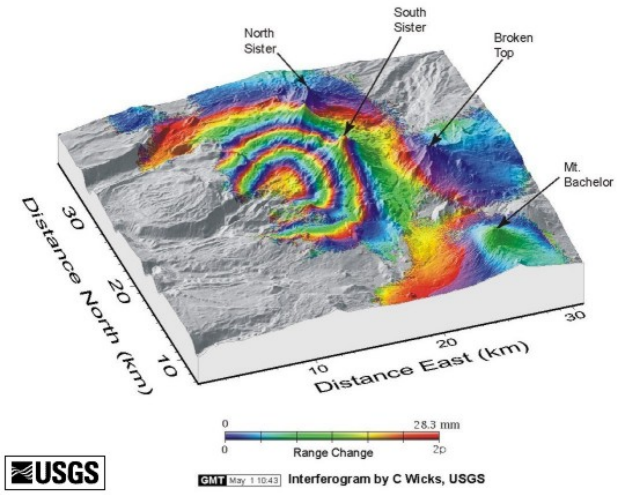
1. What kind of crater is shown in the center of the picture and how did it form?

2. The image at left shows the aftermath of a flood of debris caused by Hurricane Mitch as it moved over the Casita Volcano in Nicaragua in 1998. What are such debris floods called when they are connected with volcanos and how to you know this is one?

3. The picture at left shows the aftermath of an eruption of the original “Geysir”. Where is it and why does it (and other geysers erupt periodically instead of steadily?

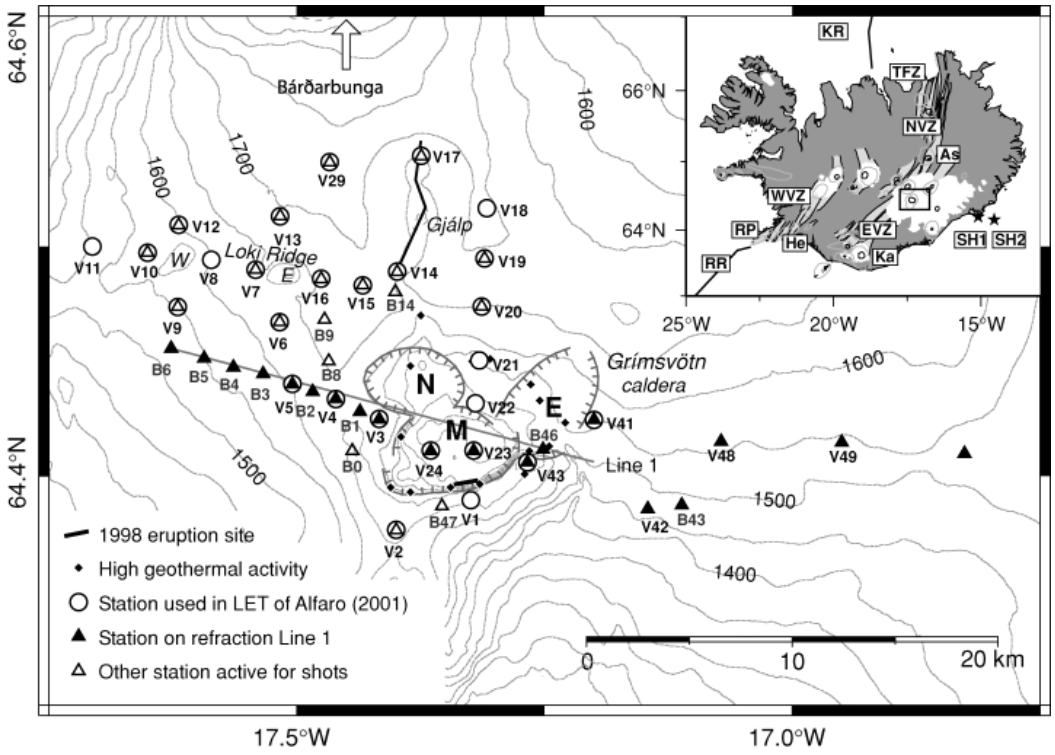
4. The rock at left is rhyolite. This rock is felsic. Tell me what this means about the eruption that created it.

5. What is the feature on the right called? What sorts of eruptions build such features (Hawaiian, Vulcanian, Plinian, Ultra-Plinian or phreatic?)



6. The image at left shows an image made by combining two passes of a Synthetic Aperture Radar over the Three Sisters volcano in Oregon to make an interferogram. A single rainbow shows a change in range of ~28mm with successive changes adding more of a change. What do these changes indicate about this volcanic system?

2. Using earthquakes to learn about volcanoes (20 points)



The map above (from Alfaro et al., Geophysical Journal Intl., 2007) shows a map of seismic stations around the Grimsvotn caldera in Iceland. Geographic context is given by the map in the upper right. The triangles show seismic stations.

1. Design a strategy using earthquakes generated in the North Volcanic Zone and stations V21 (north of the caldera), V2 (south of the caldera), V16 (northwest of the caldera) and V5 (west of the caldera) to evaluate whether there is a magma chamber underneath Grimsvotn. (Hint: how would the presence of magma alter the P and S waves?) (15 points, T2)

2. The map in the upper right shows multiple volcanic zones, the North (NVZ), east (EVZ), west (WVZ) and Reykjanes Peninsula (RP). Why do these zones all trend in the same general direction? (5 points)

C. Definitions/ID (2 points each)

1. Richter magnitude:

2. Rayleigh Wave:

3. Thera:

4. Black smoker:

5. Mercalli Magnitude:

6. Dike :

7. Mount Redoubt:

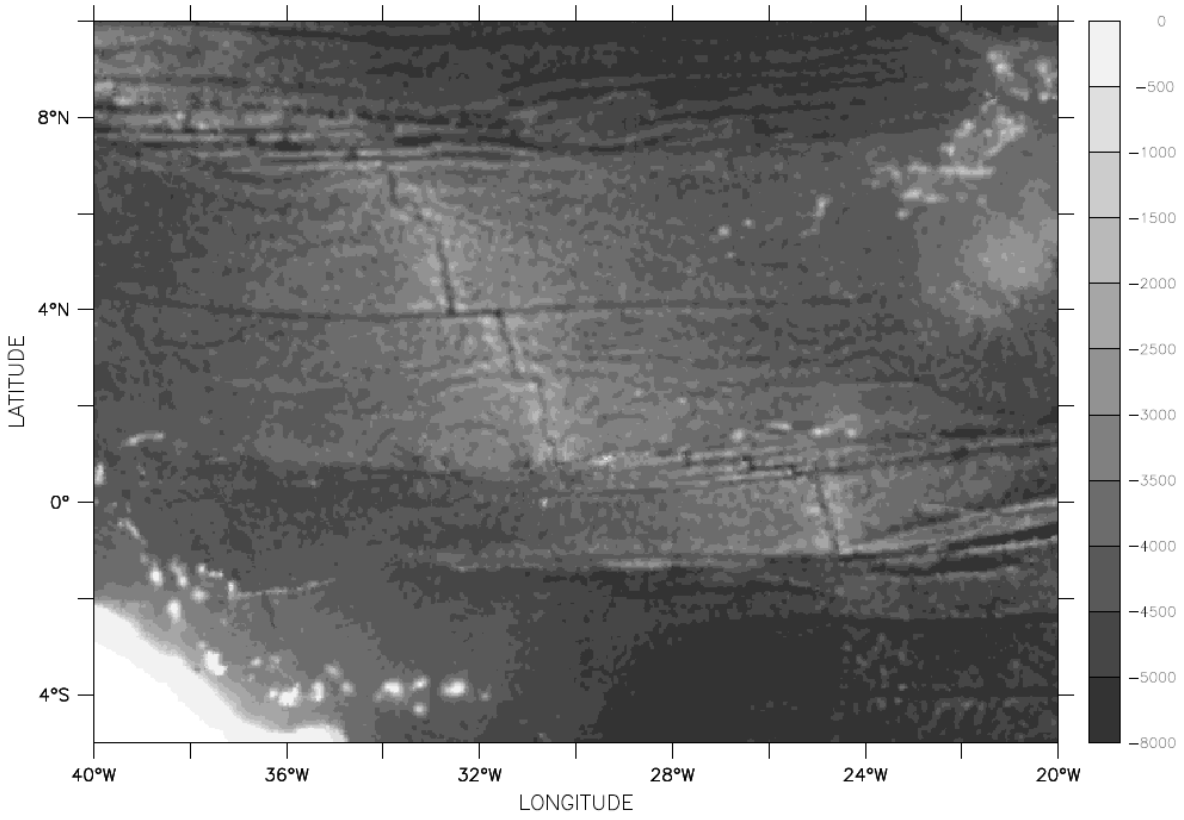
8. Pumice:

9. Aesthenosphere:

10. San Andreas Fault:

D: Topographic interpretation (20 points)

The picture below shows the bottom of the central Atlantic

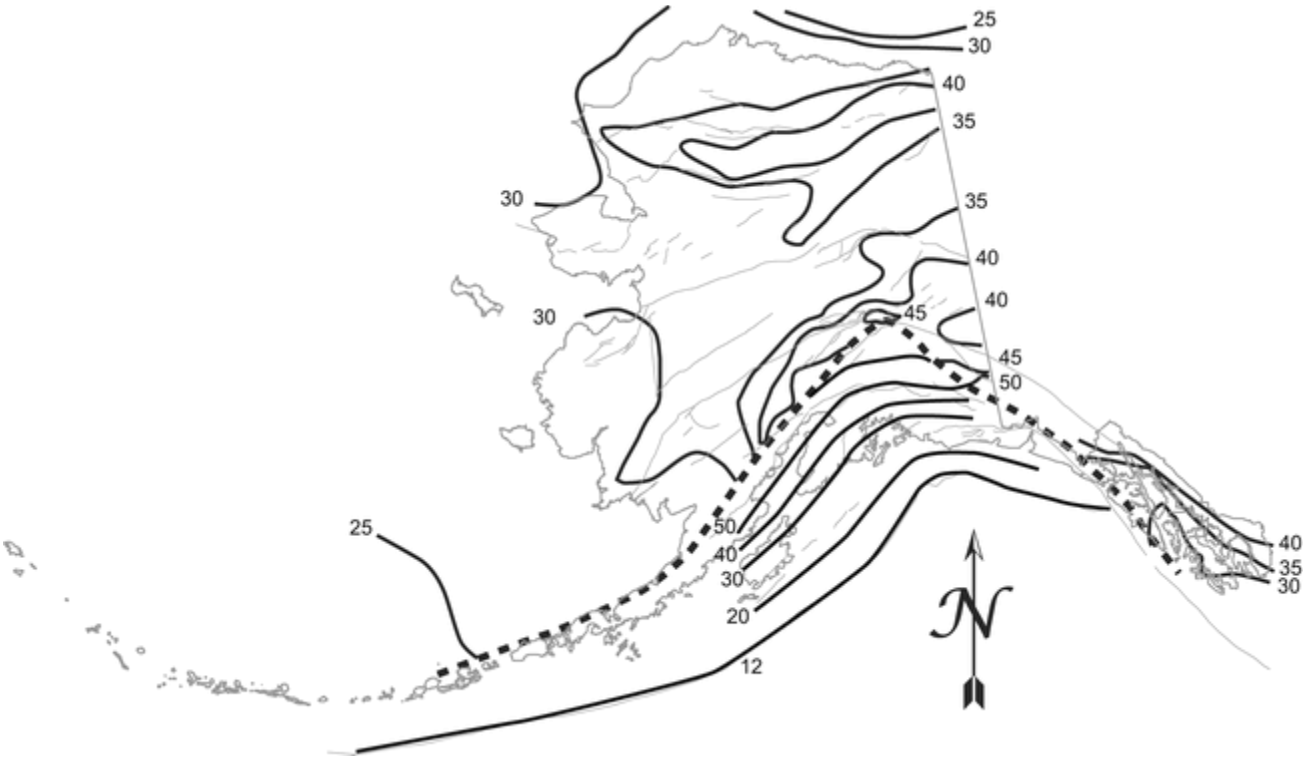


Topography (m)

Identify on the map (4 points each)

1. Areas where you would expect normal faulting.
2. Areas where you would expect transform faulting.
3. Areas where you would expect to find an aseismic fault.
4. The direction of plate motion.
5. Lines of constant magnetic anomaly.

E. The Moho



The figure above shows the depth of the Mohorovic discontinuity in and near Alaska.

1. Describe the pattern of Moho depth (5 points, T2).

2. Why is it shallow in some locations and deeper in others? (5 points)