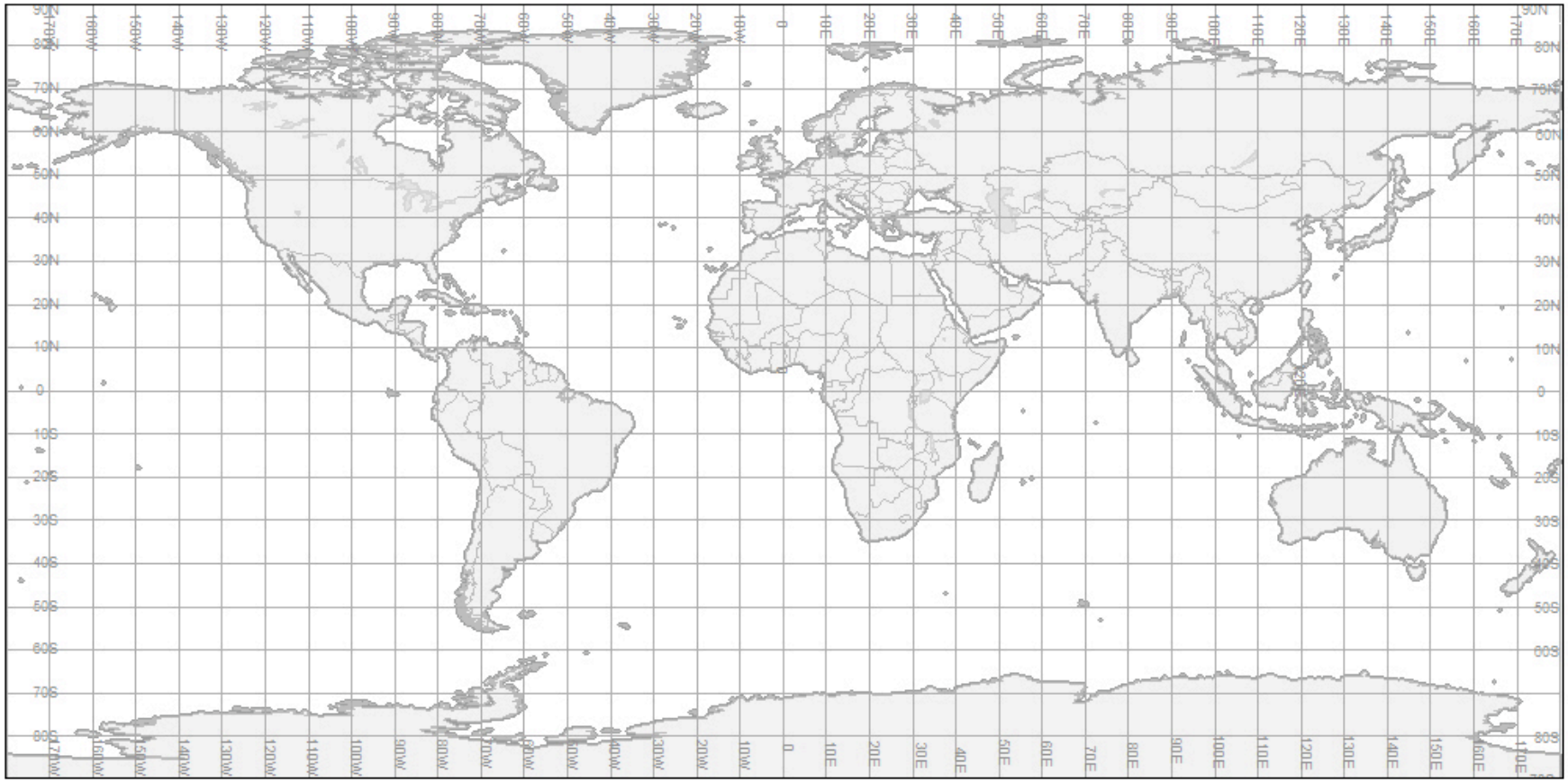
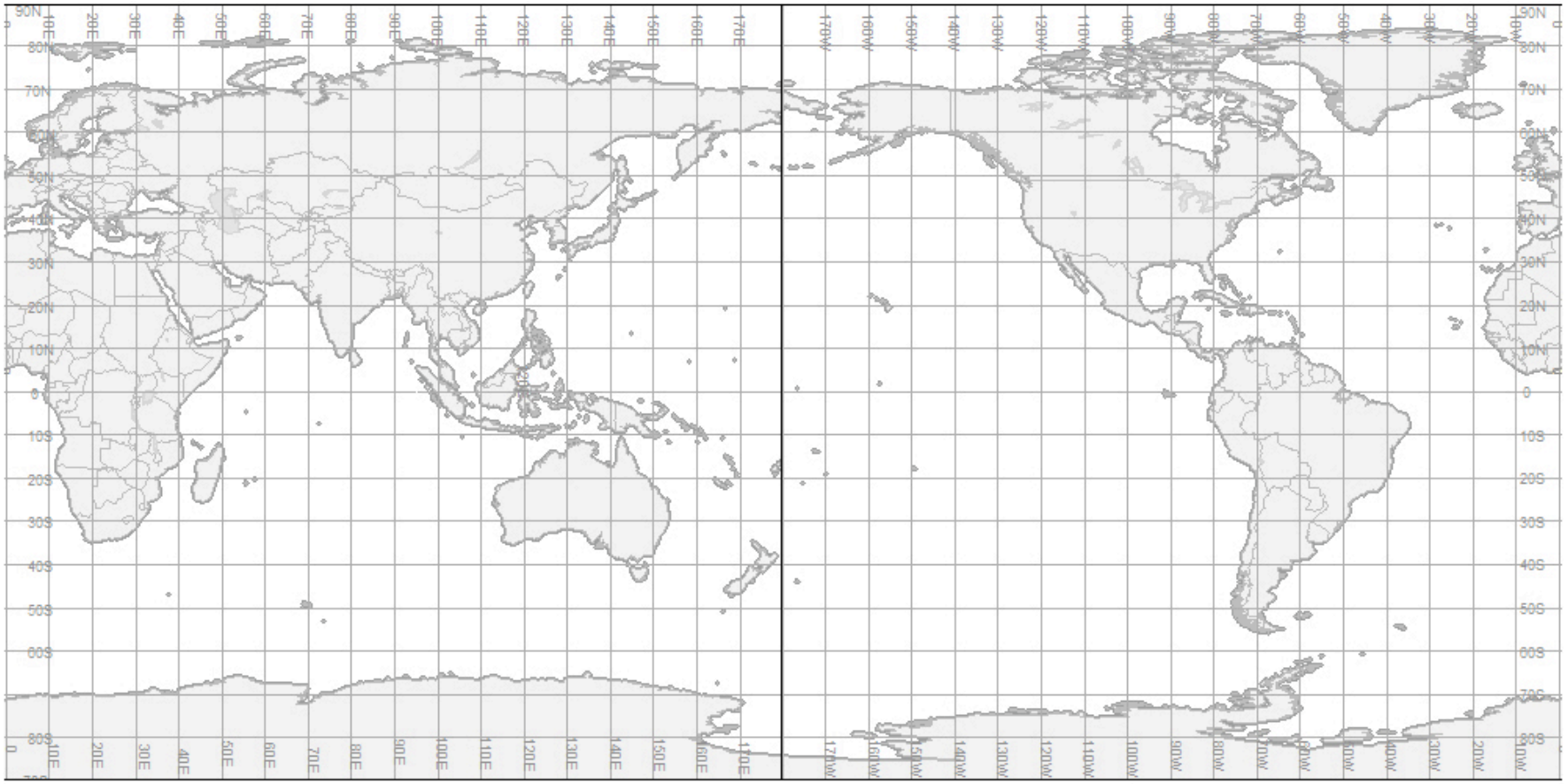
Small World Map

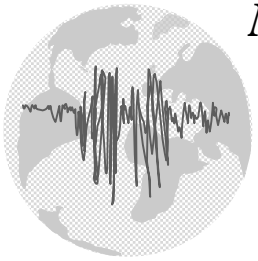


Small World Map

Small World Map (Pacific)



Small World Map Pacific



National Earth Structure Survey
111 E. Old Trench Road
Washington D.C. 20005

Dear Explorers:

In response to the effects of catastrophic earthquakes and volcanoes on our growing population, the National Earth Structure Survey (NESS) is pulling together a team to study patterns of these events and possibly explain why these events are occurring.

Your class has the honor of being selected to participate in this project. We searched high and low for a group that could meet the challenge. Below is a brief description of project goals. We look forward to your contributions.

Your class will be divided into teams that will each look closely at the seismic and volcanic activity of specific regions we have identified. Each region is identified with a structure of the earth: volcano, mountain, trench, or rift. These earth structures will be home base for your team. Teams will come together periodically to compare their observations and explanations.

Your task:

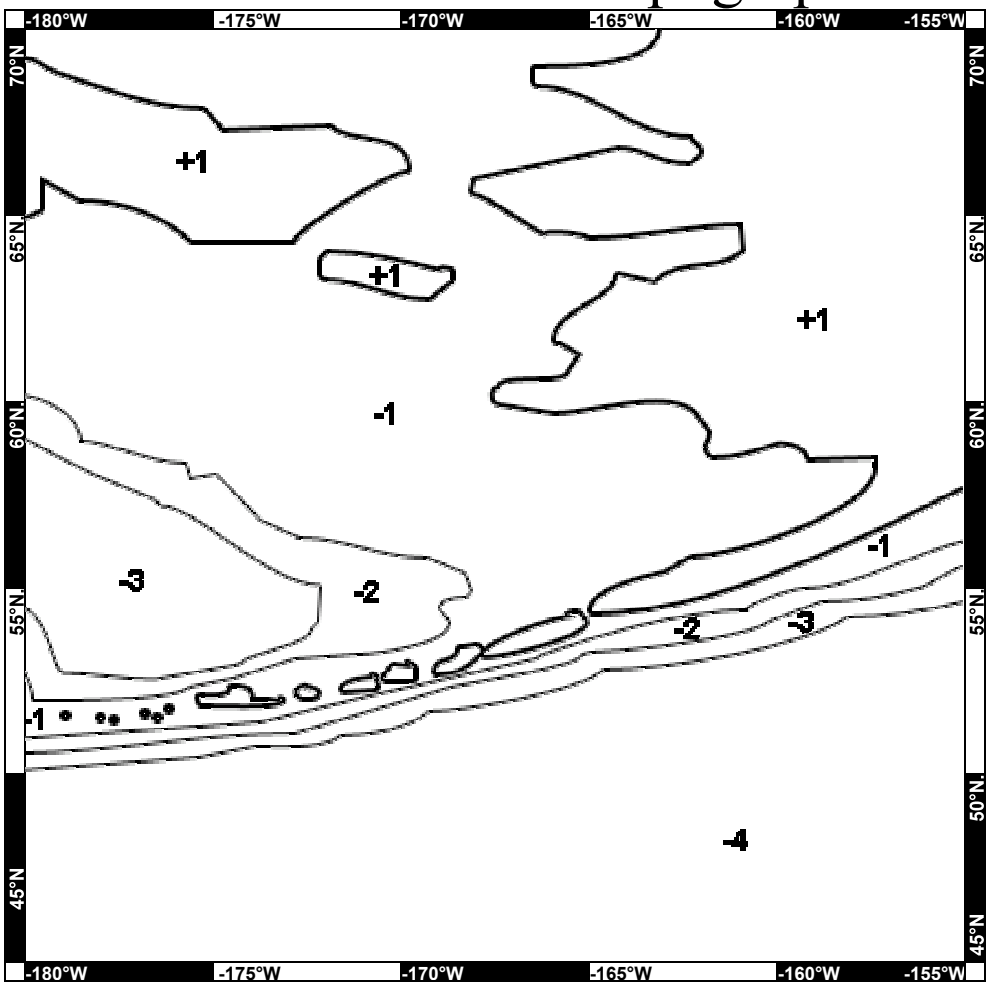
- See if there is a predictable pattern of earthquakes and/or volcanoes.
- If so, what is that pattern?
- What evidence do you have to support that pattern?
- Why are these events occurring? What changes are resulting?
- Are there areas in a particular region that require further analysis?

We have found a Junior Scientist Assistant from each region to help you get acquainted with the region and earth structure. Enclosed you will find letters from these fellow team members. We look forward to your hard work and contributions.

Thank you and best regards,

Dr. Seismic P. Wave

Aleutian Islands Cutout Topographic Map



ELEVATION KEY: COLOR IN EACH NUMBER

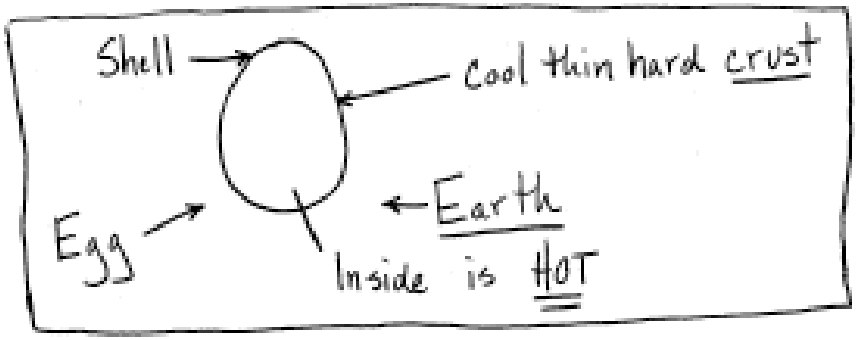
+4	=	More than +4,500 m above sea level
+3	=	+3,000 to +4,500 m above sea level
+2	=	+1,500 to +3,000 m above sea level
+1	=	0 to +1,500 m above sea level
_	=	Sea Level
-1	=	0 to –1,500 m below sea level
-2	=	-1,500 to –3,000 m below sea level
-3	=	-3,000 to –4,500 m below sea level
-4	=	-4,500 to –6,000 m below sea level
-5	=	More than –6,000 m below sea level

INSTRUCTIONS

- Pick a color for each elevation
- Color each number box →
- Color the map by number
- Use map for making a model

Journal Notes from Benny Makmur of the Island of Java

The Egg : The Earth



The egg represents the earth. The outside of the earth is a hard cool shell called the crust.

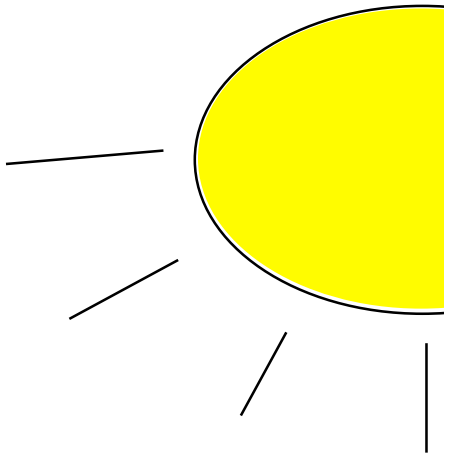
Crack that shell

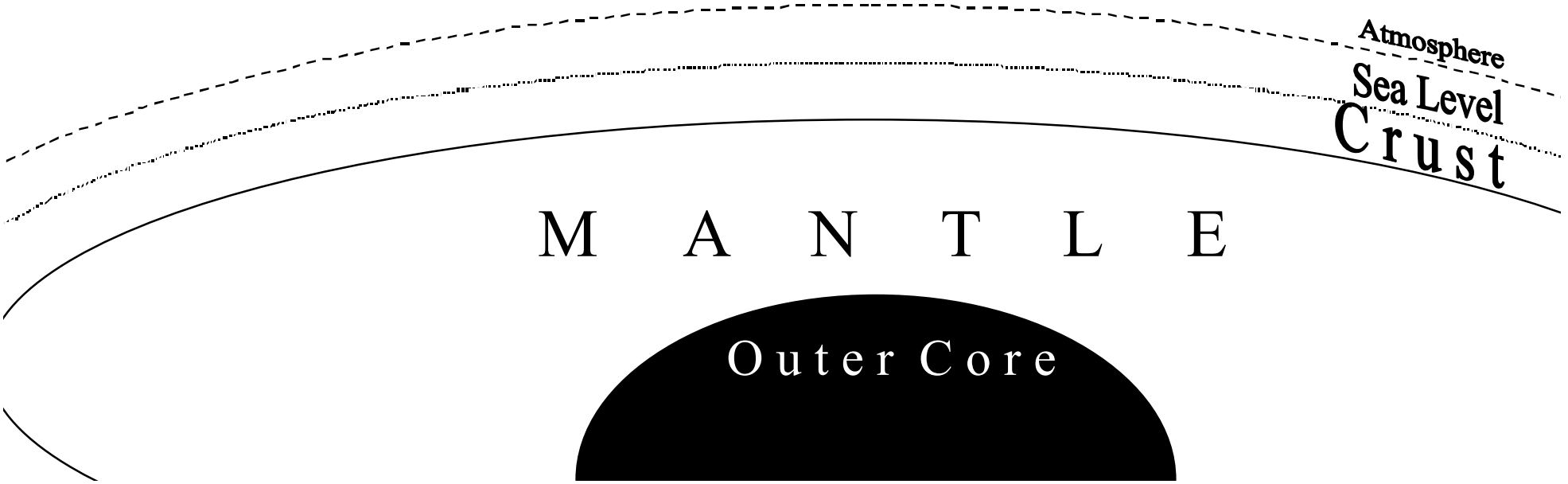
The crust of the earth is cracked. Each of these pieces is called a plate.

Name _____

The Cool Crust

Directions: Draw the things you think are part of the Earth's crust.





Update time = Thu Oct 7 20:26:27 UTC 2004

MAG	DATE y/m/d	UTC-TIME h:m:s	LAT deg	LON deg	DEPTH km	LOCATION
MAP 3.4	2004/10/07	08:23:32	42.058	-120.424	5.0	16 km (10 mi) SSW of Lakeview, OR
MAP 4.1	2004/10/06	18:31:34	61.476	-146.635	29.9	43 km (27 mi) NNW of Valdez, AK
MAP 3.1	2004/10/06	08:01:38	19.014	-68.022	62.7	85 km (53 mi) ENE of Higüey, Dominica
MAP 3.2	2004/10/05	15:15:35	40.384	-125.057	8.2	66 km (41 mi) W of Petrolia, CA
MAP 3.0	2004/10/05	11:57:02	57.763	-154.690	60.0	28 km (18 mi) NW of Karluk, AK
MAP 3.0	2004/10/04	17:08:36	19.206	-66.628	21.7	82 km (51 mi) NNE of Carrizales, PR
MAP 3.0	2004/10/04	16:55:26	19.183	-66.652	25.0	79 km (49 mi) N of Carrizales, PR
MAP 3.0	2004/10/04	11:19:04	51.208	-176.508	25.2	76 km (47 mi) S of Adak, AK
MAP 3.2	2004/10/04	07:24:51	53.793	-163.139	3.3	116 km (72 mi) S of False Pass, AK
MAP 3.6	2004/10/03	20:35:02	18.448	-68.618	161.9	21 km (13 mi) SSE of Higüey, Dominica
MAP 4.7	2004/10/03	12:26:53	51.287	-176.663	41.3	66 km (41 mi) S of Adak, AK
MAP 3.1	2004/10/03	11:06:59	19.102	-66.641	25.0	71 km (44 mi) NNE of Carrizales, PR
MAP 3.7	2004/10/03	07:40:47	57.084	-145.950	1.0	352 km (219 mi) SSE of Chenega, AK
MAP 3.4	2004/10/03	06:46:11	54.547	-162.995	60.0	41 km (25 mi) SE of False Pass, AK
MAP 3.5	2004/10/03	04:29:00	61.700	-149.684	25.0	11 km (7 mi) NNE of Houston, AK
MAP 3.1	2004/10/03	00:32:16	33.233	-115.700	3.3	9 km (6 mi) NW of Obsidian Butte,
MAP 3.8	2004/10/02	23:18:12	57.044	-145.814	30.6	359 km (223 mi) SSE of Chenega, AK
MAP 3.1	2004/10/02	22:17:52	46.200	-122.197	1.7	1 km (1 mi) W of Mount St. Helens
MAP 3.1	2004/10/02	22:12:40	35.939	-120.486	10.6	7 km (4 mi) NW of Parkfield, CA
MAP 4.5	2004/10/02	22:09:27	57.104	-145.848	48.2	352 km (219 mi) SSE of Chenega, AK

http://earthquake.usgs.gov/recenteqsUS/Quakes/quakes_big.html

National Earth Structure Survey

111 E. Old Trench Road
Washington D.C. 20005

Dear Junior Science Team:

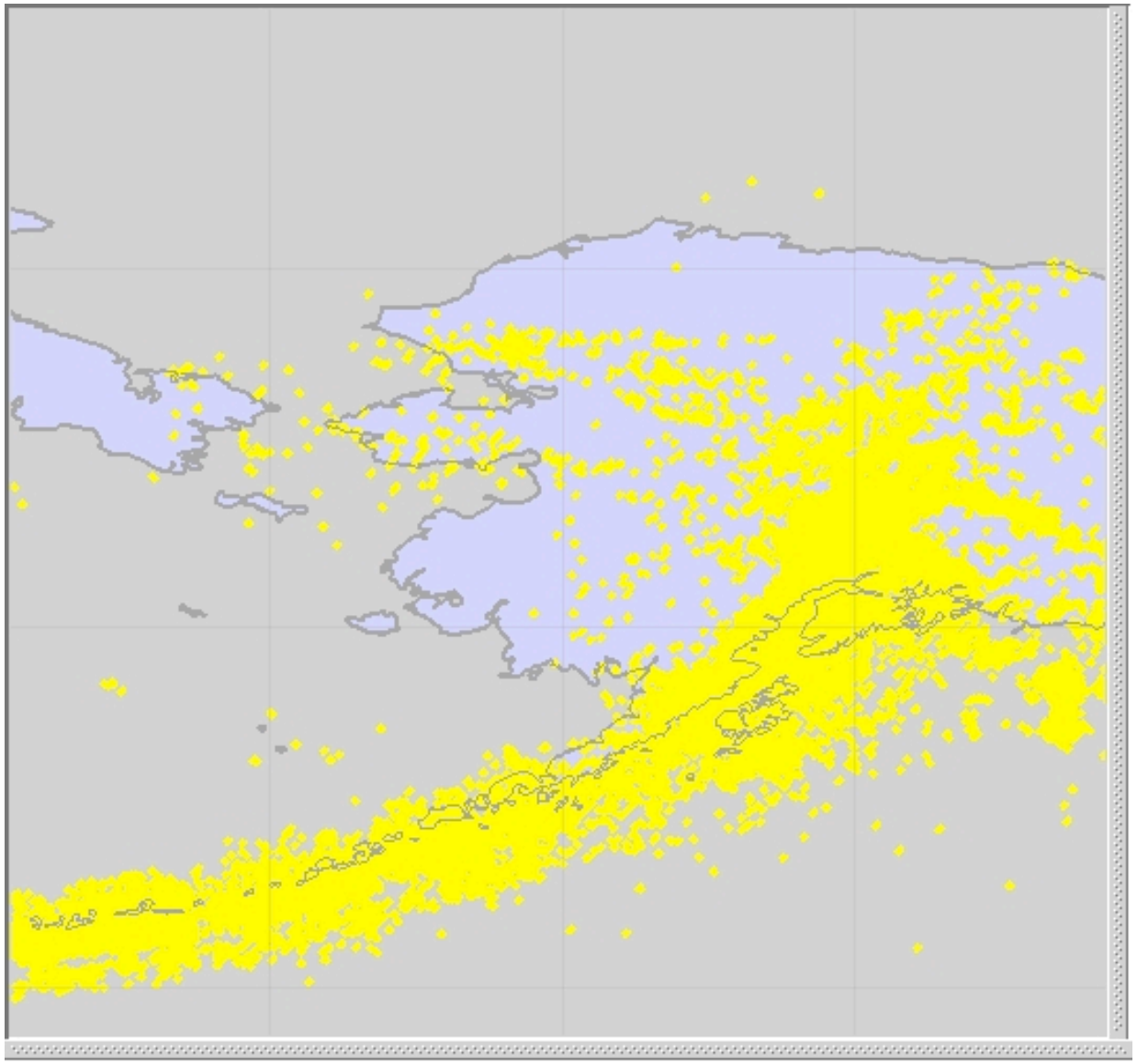
We are impressed with the progress you have made so far on this project. We understand that you have decided to look at patterns in the earthquake data. This makes sense, since earthquakes are more frequent than volcanoes and also happen around volcanoes. We also understand that you are looking at earthquake data in order to find the Earth's plate boundaries.

We look forward to hearing about those plate boundaries and the patterns you have found in the earthquake data. Please include the data that supports your findings.

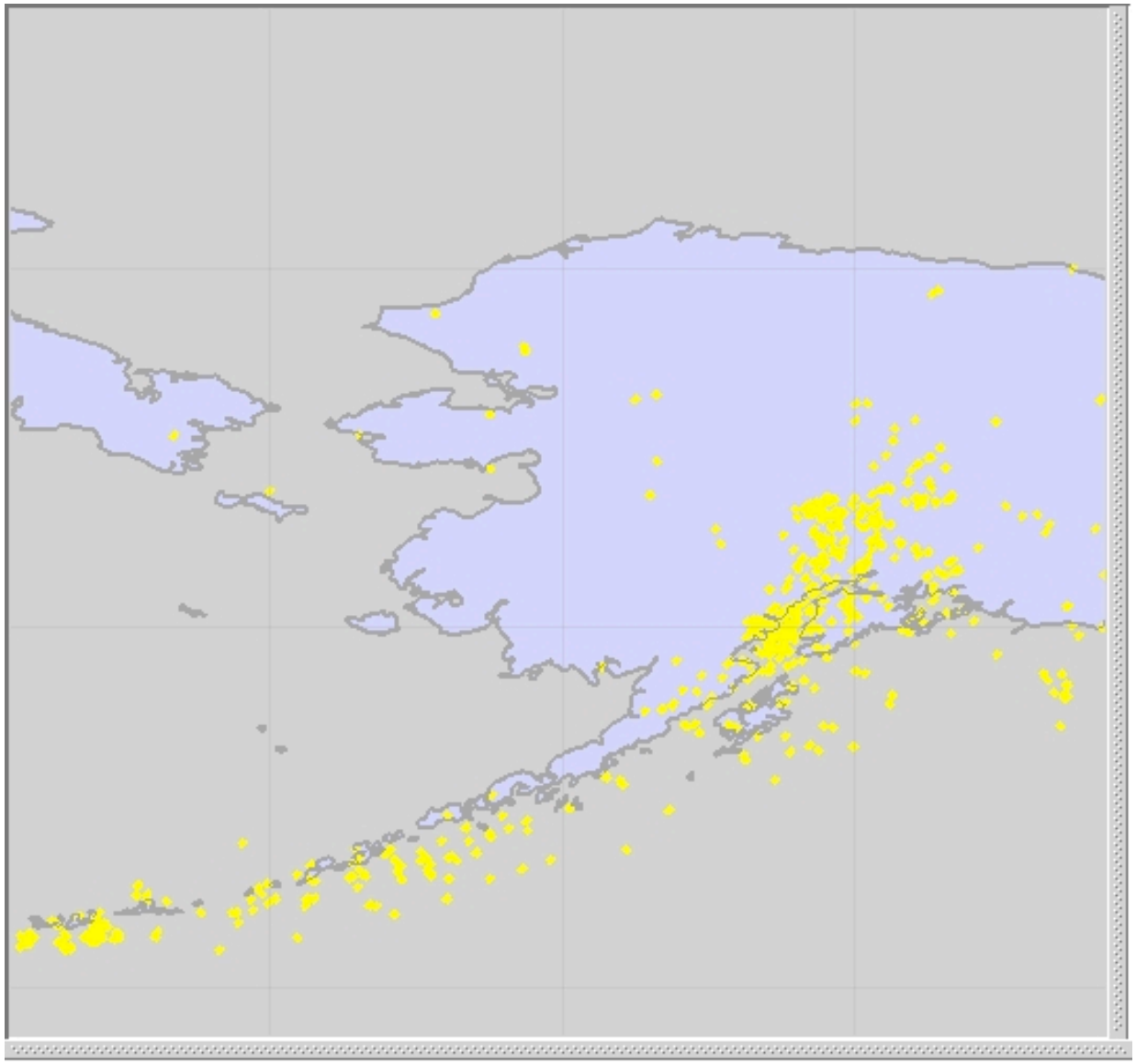
Sincerely,

Dr. Seismic P. Wave

Data Map: Too Much

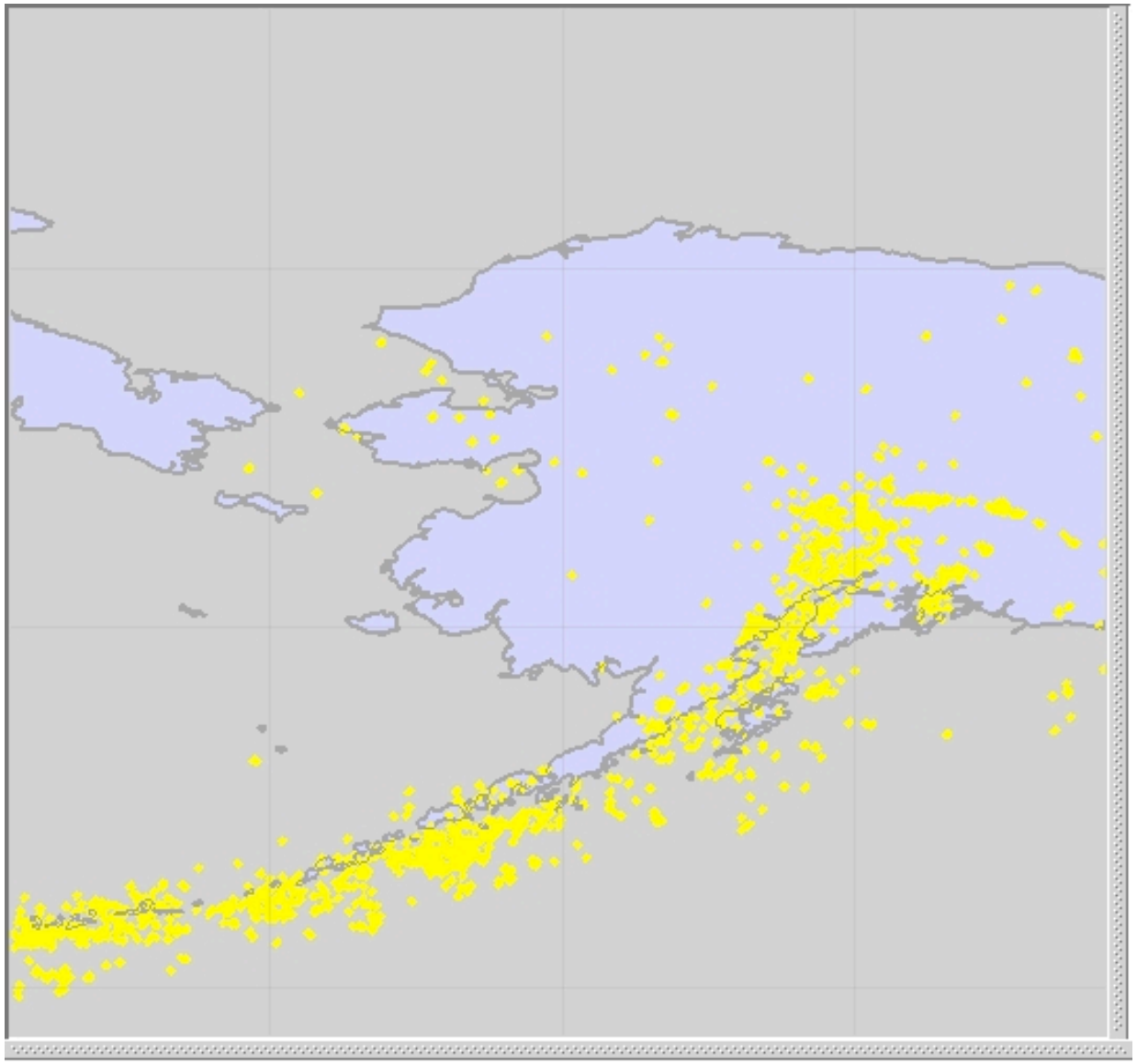


Data Map: Too Little

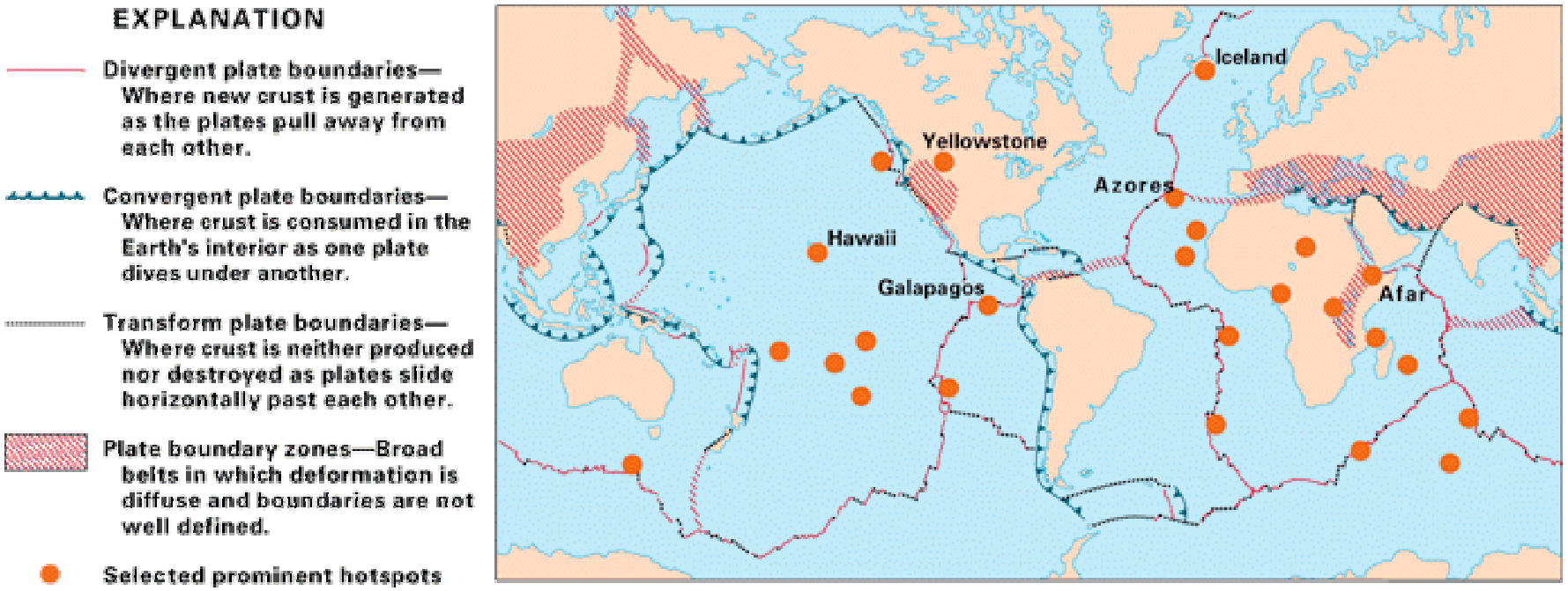


Lesson 5 Transparency 3
Activity 5.2: Looking for Patterns in One Year of Data

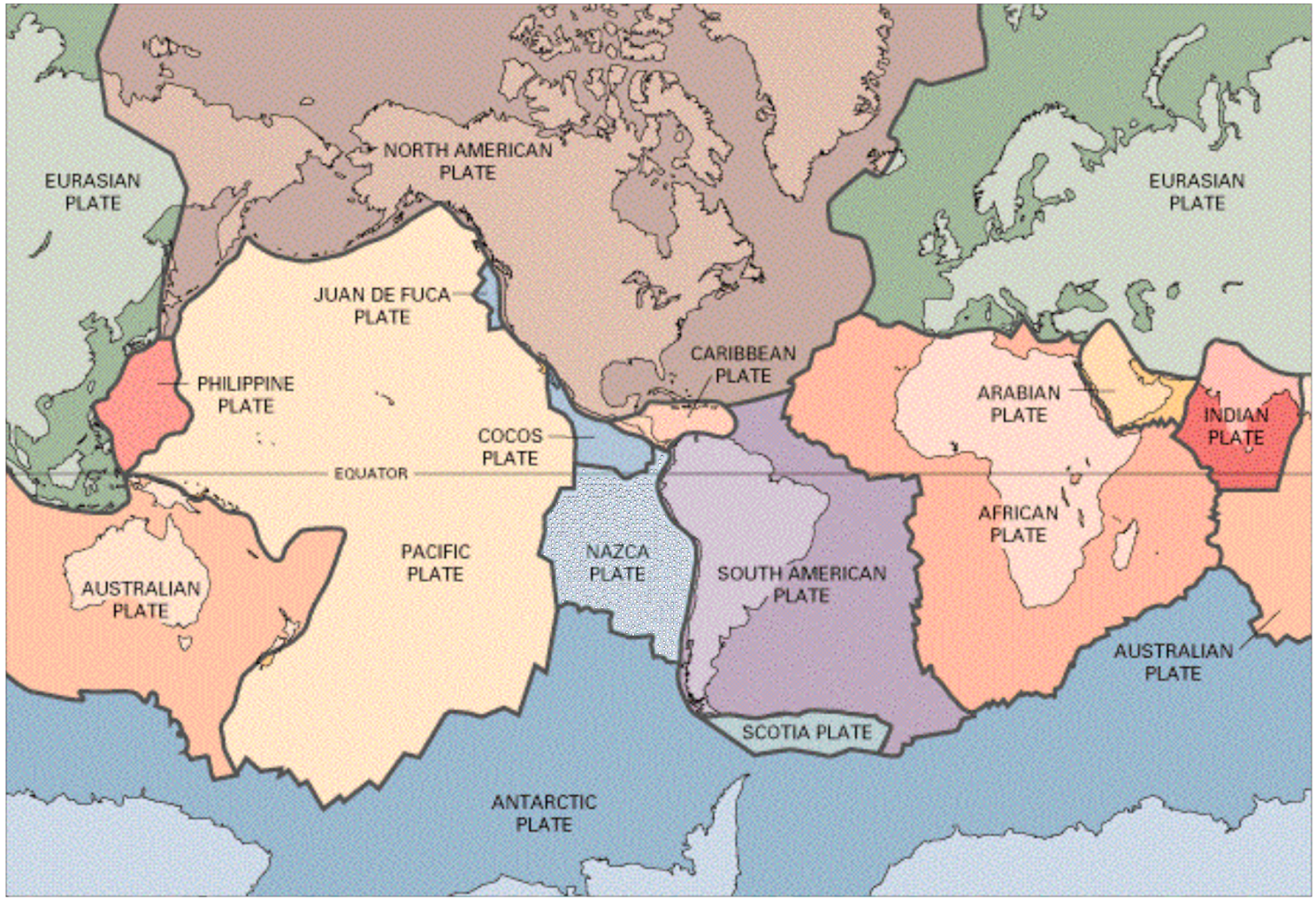
Data Map: Just Right



http://earthsci.org/geopro/platec/pltypeII.gif



http://geology.er.usgs.gov/eastern/plates.html



http://www.dpc.ucar.edu/VoyagerJr/JVV_Jr/help/helpvel.html

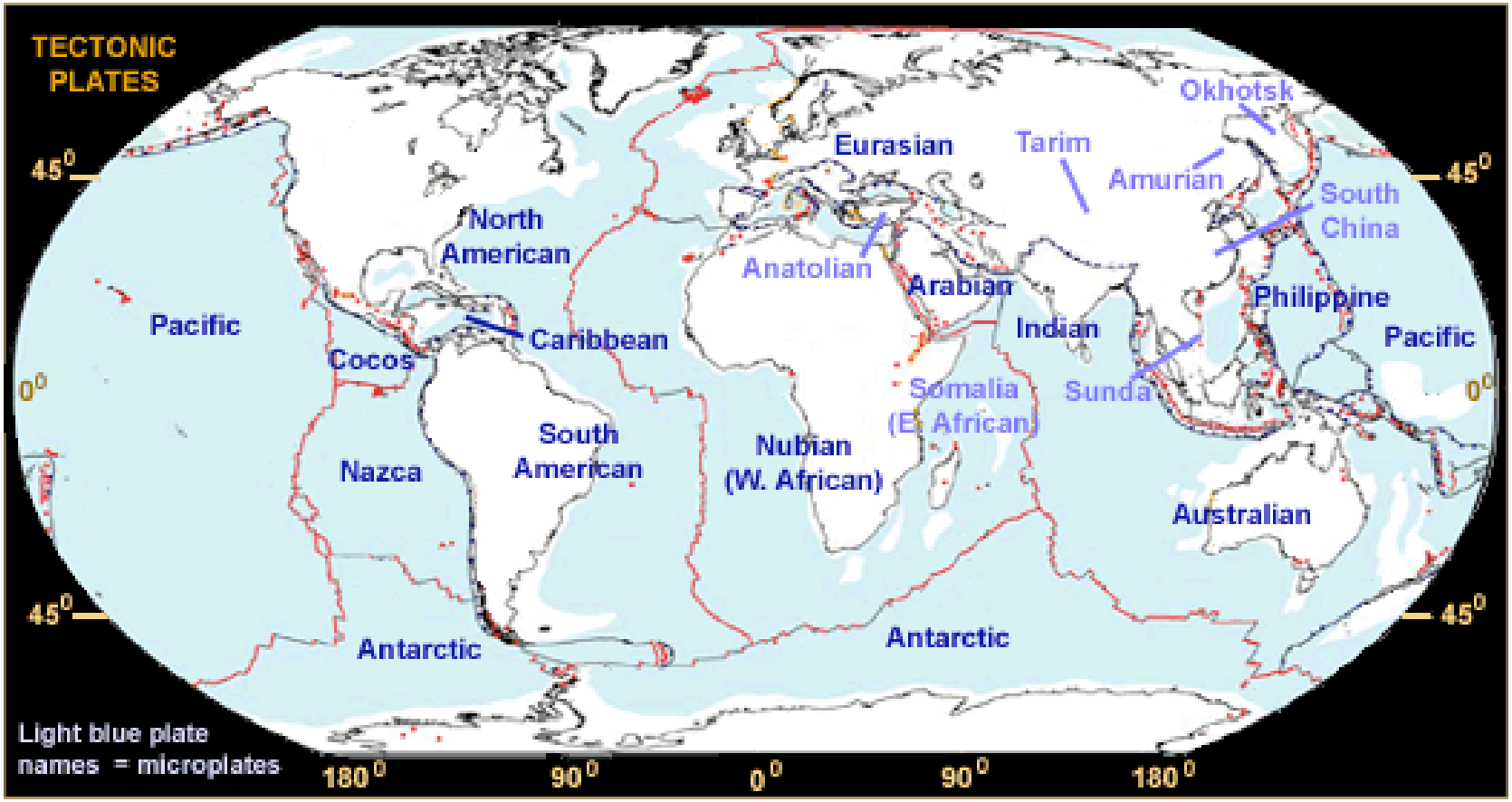
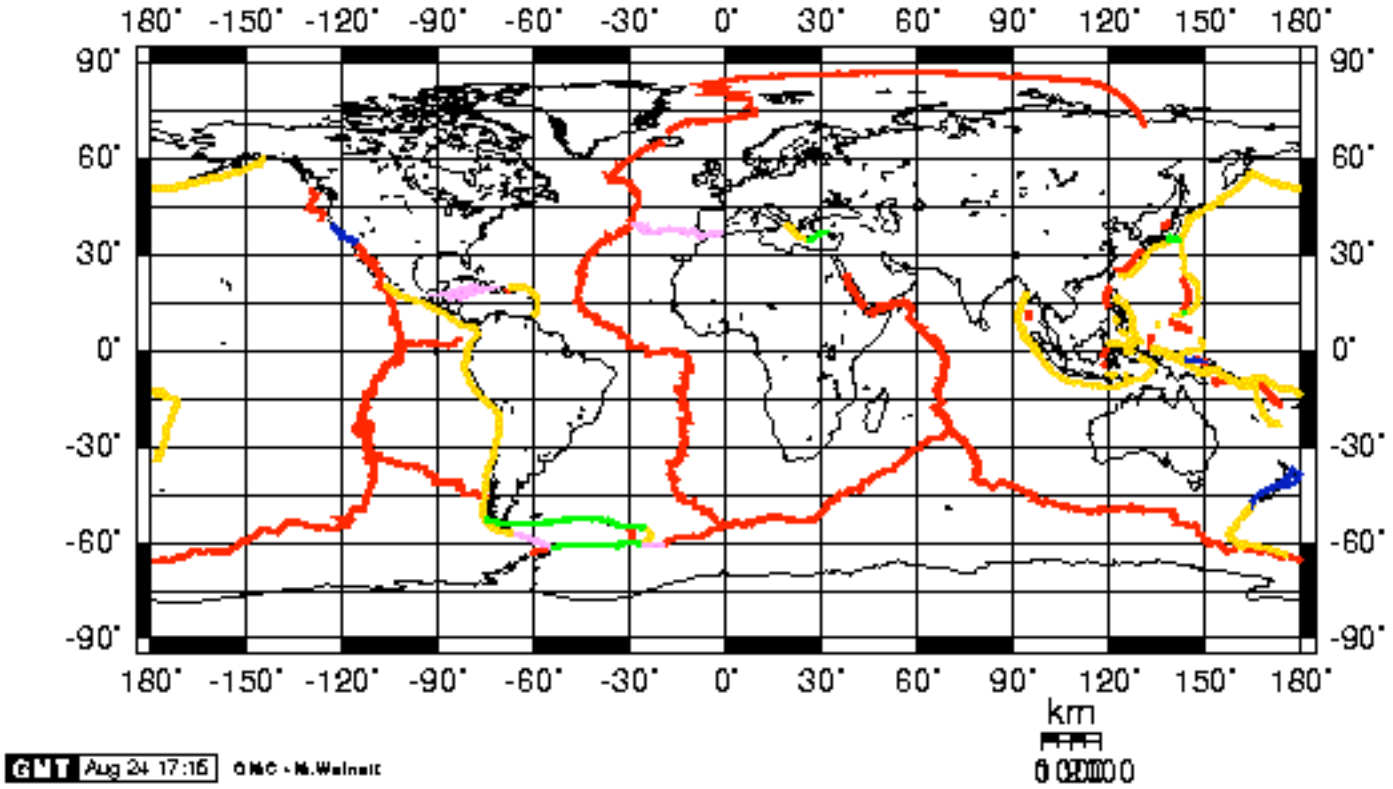


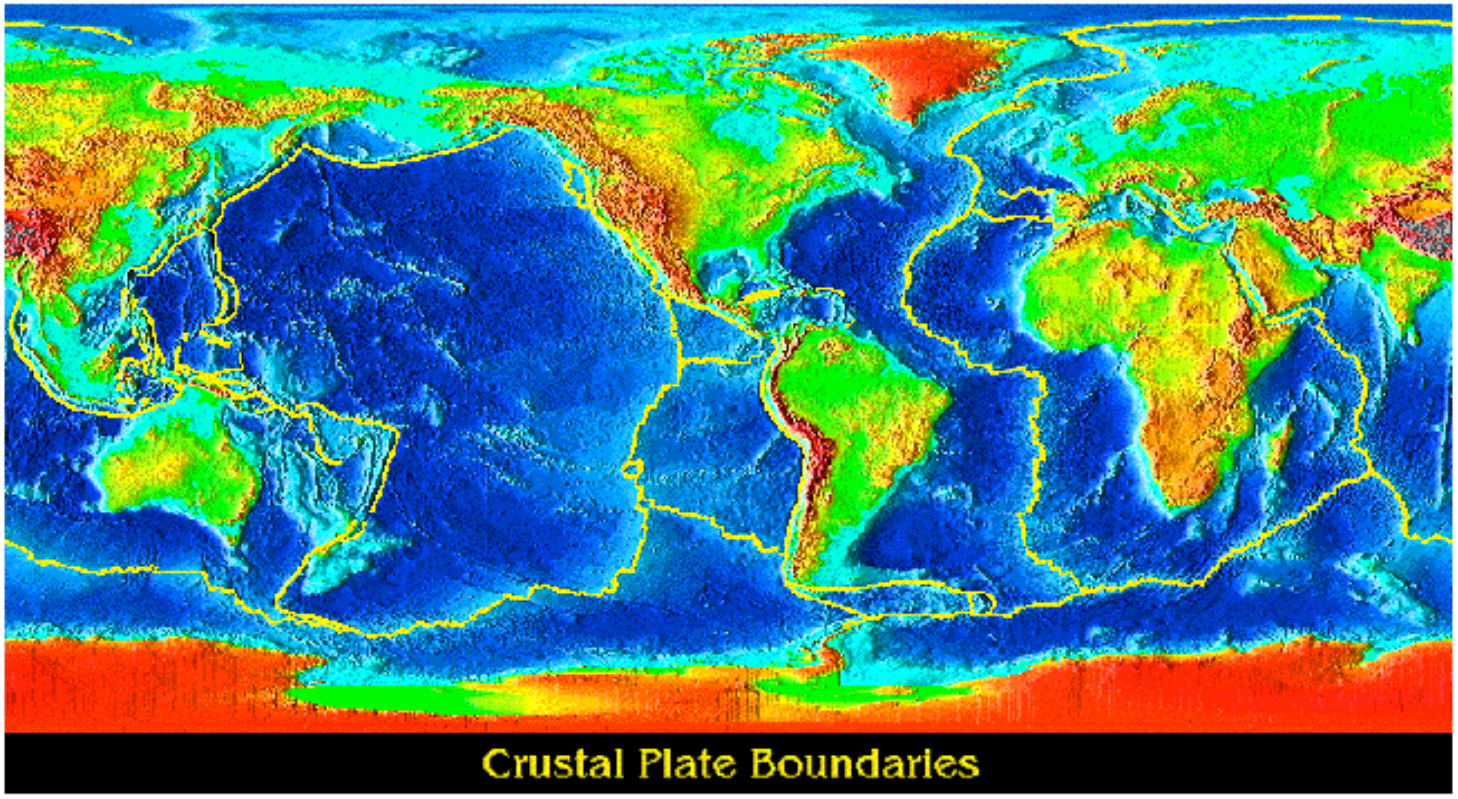
Plate Boundaries from the Create-A-Map web site

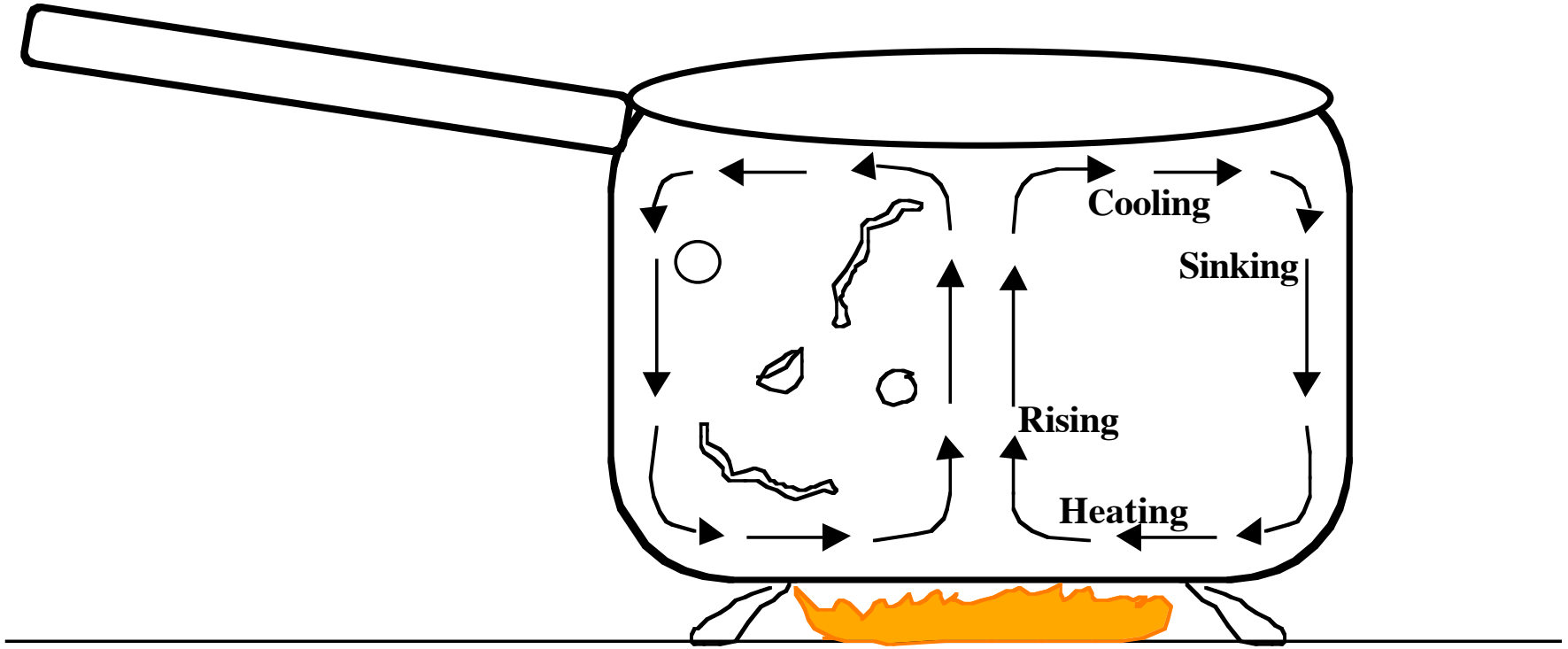
(http://www.aquarius.geomar.de/omc/make_map.html)

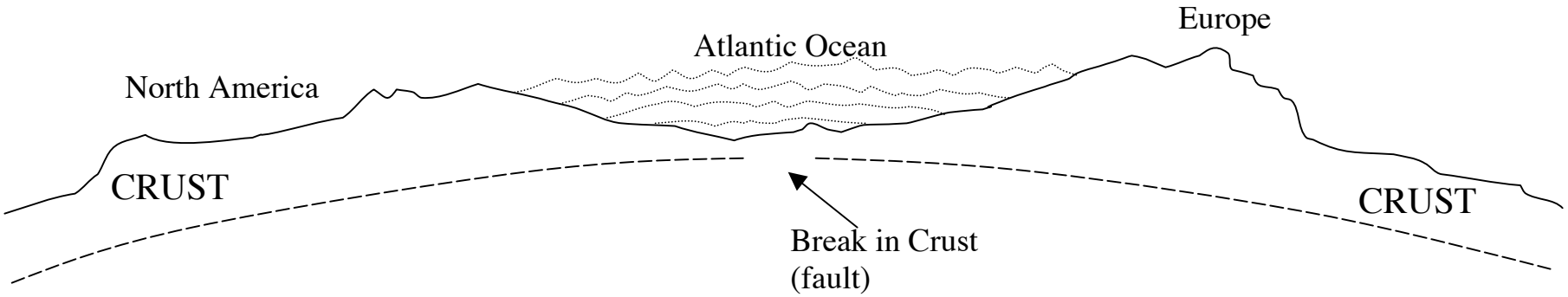


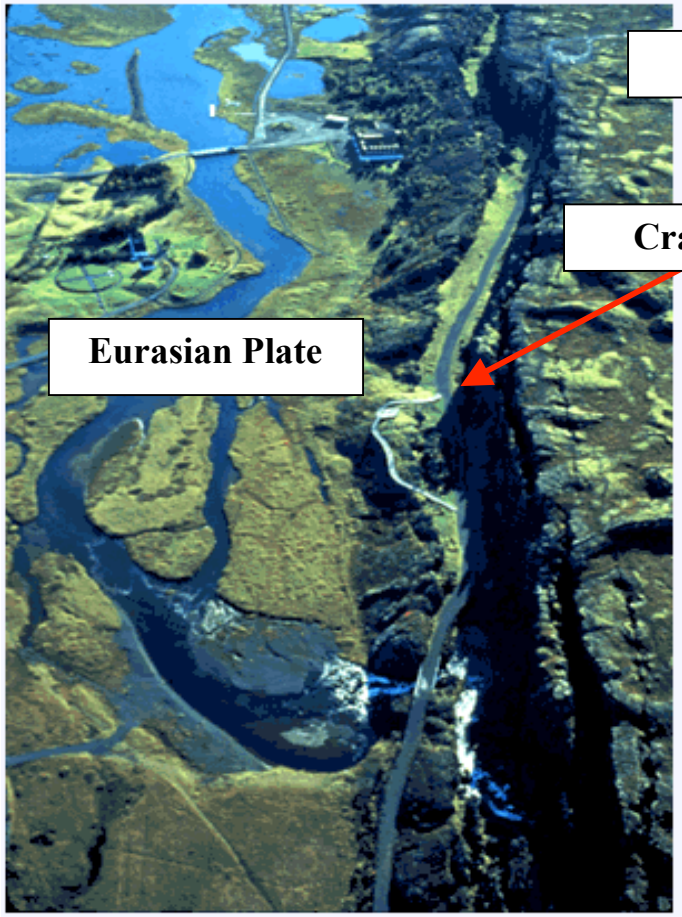
Views of the Solar System world plate map with altitude and bathymetry

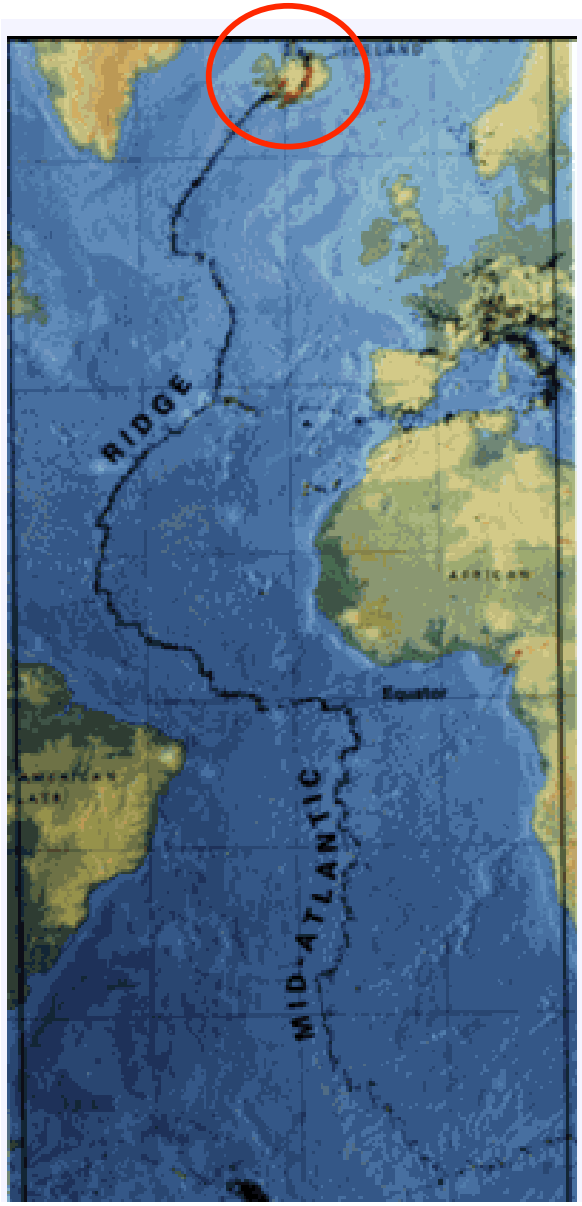
(http://www.hawastsoc.org/solar/cap/earth/plates.htm)



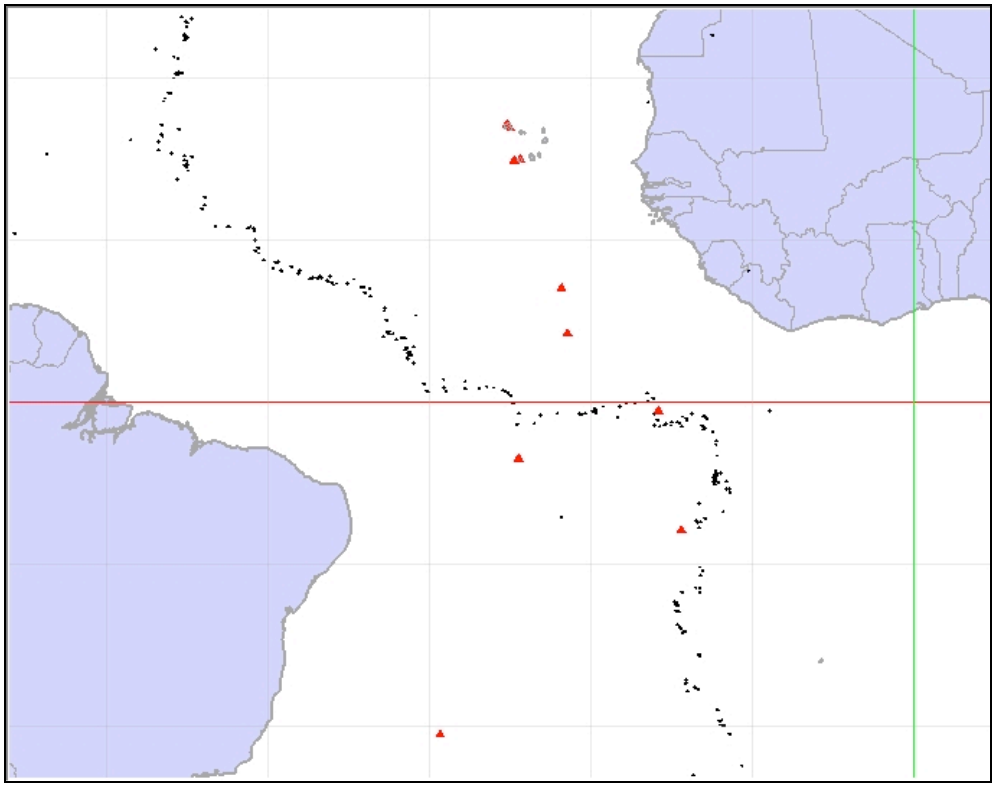

Cooling
Sinking
Rising
Heating

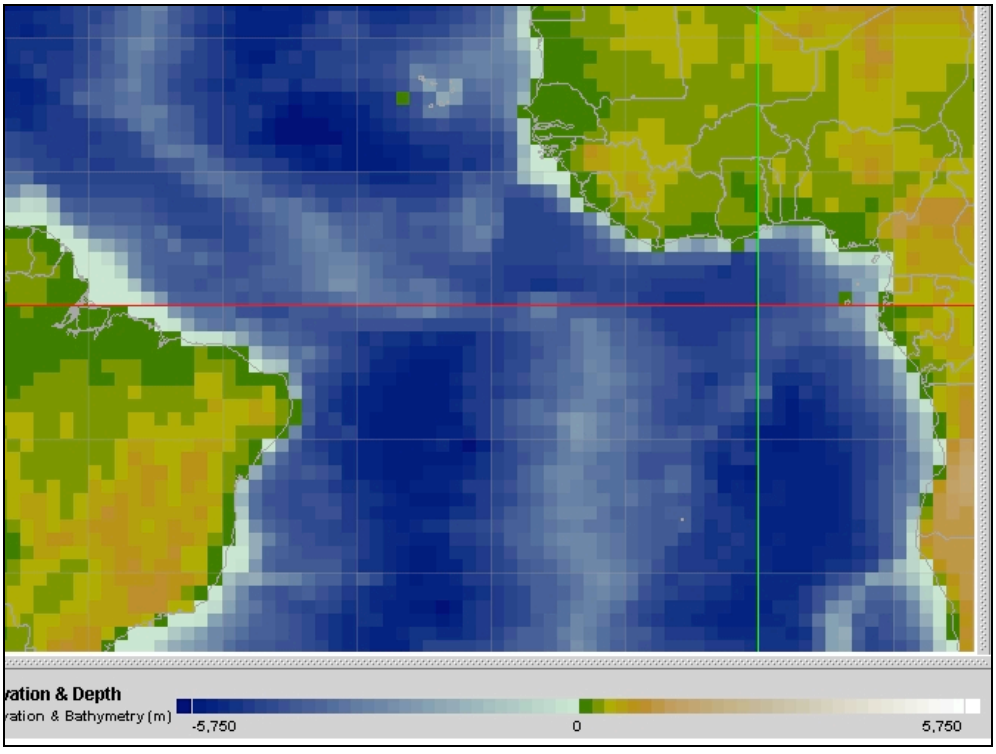

Europe
Atlantic Ocean
North America
CRUST
CRUST
Break in Crust
(fault)
MANTLE
REGION OF COOLER MAGMA
REGION OF HOTTER MAGMA
MANTLE
REGION OF COOLER MAGMA


North American
Crack or fissure
Eurasian Plate

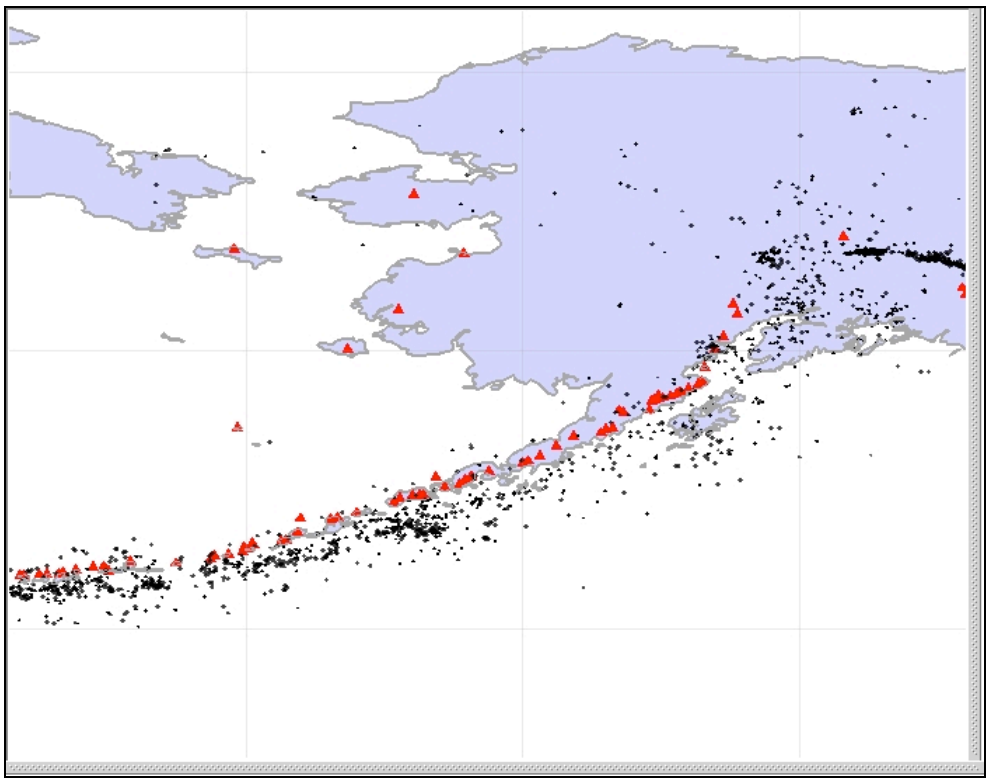

RIDGE
MID-ATLANTIC

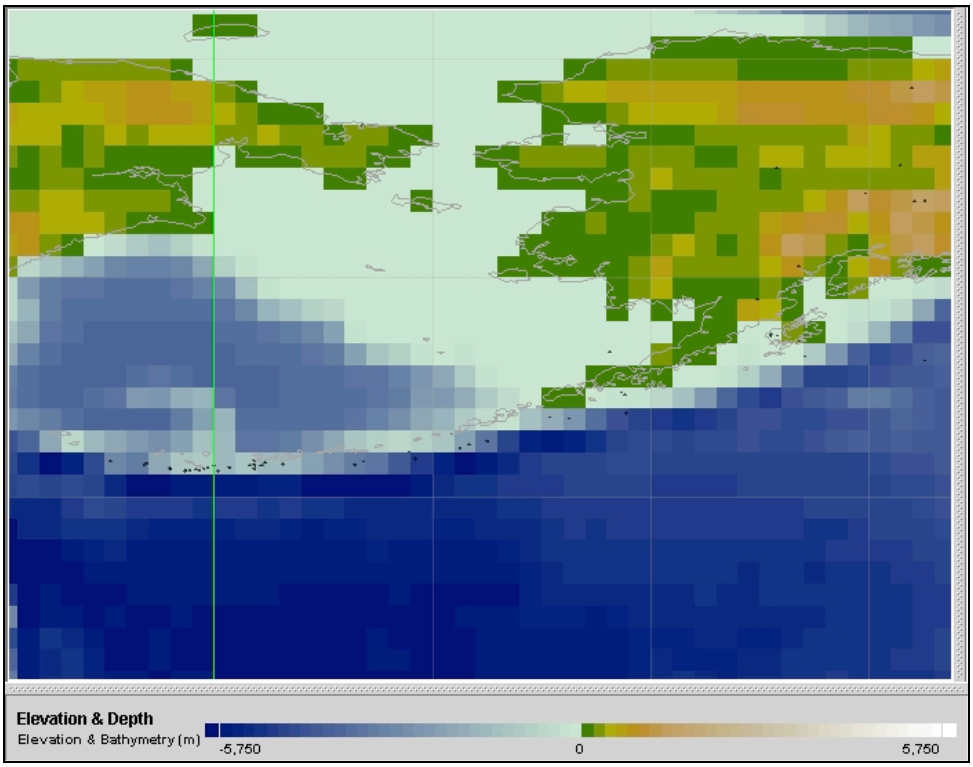
Pattern 1: Describe What You See!



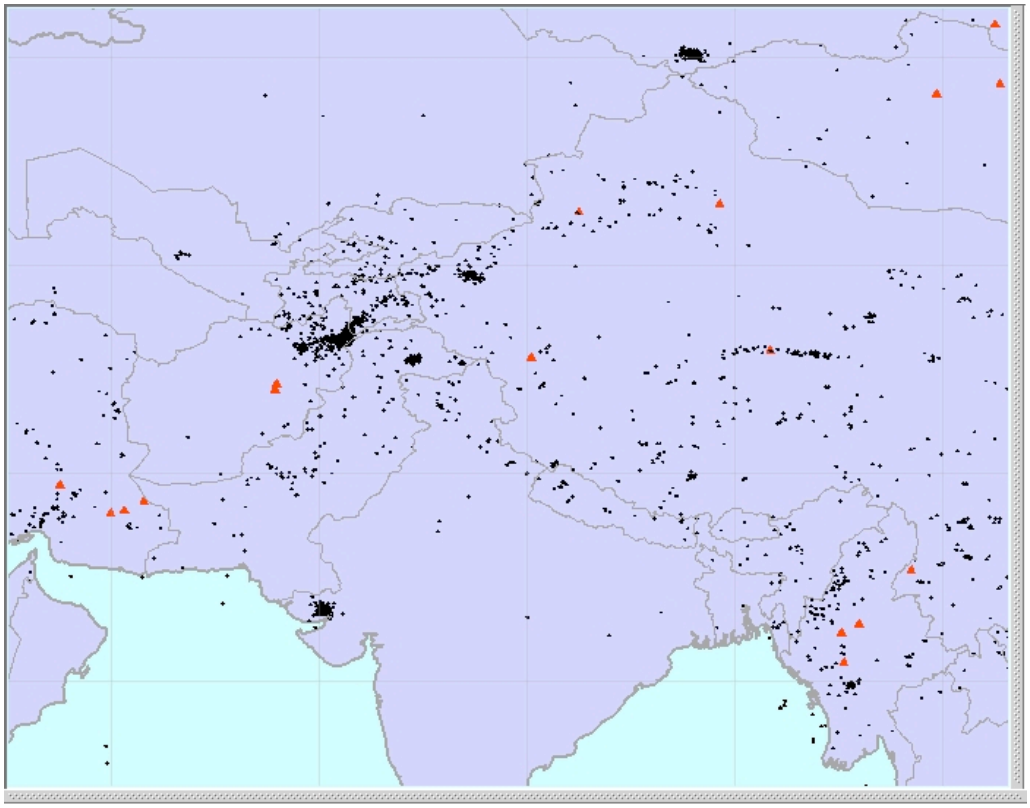


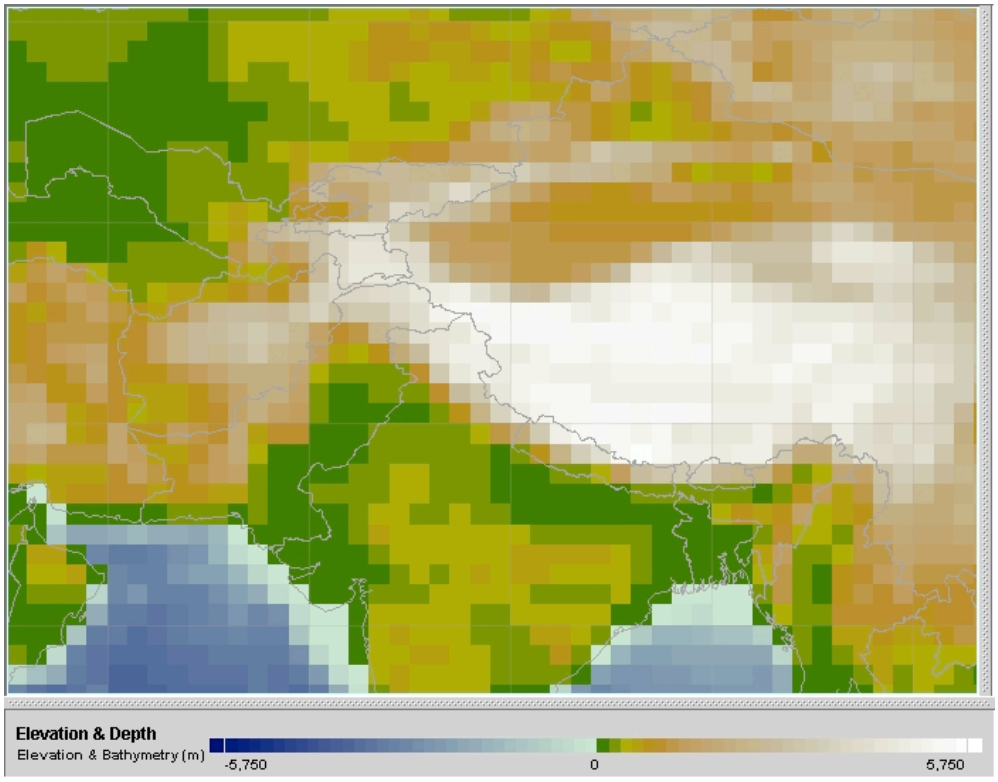
Pattern 2: Describe What You See!



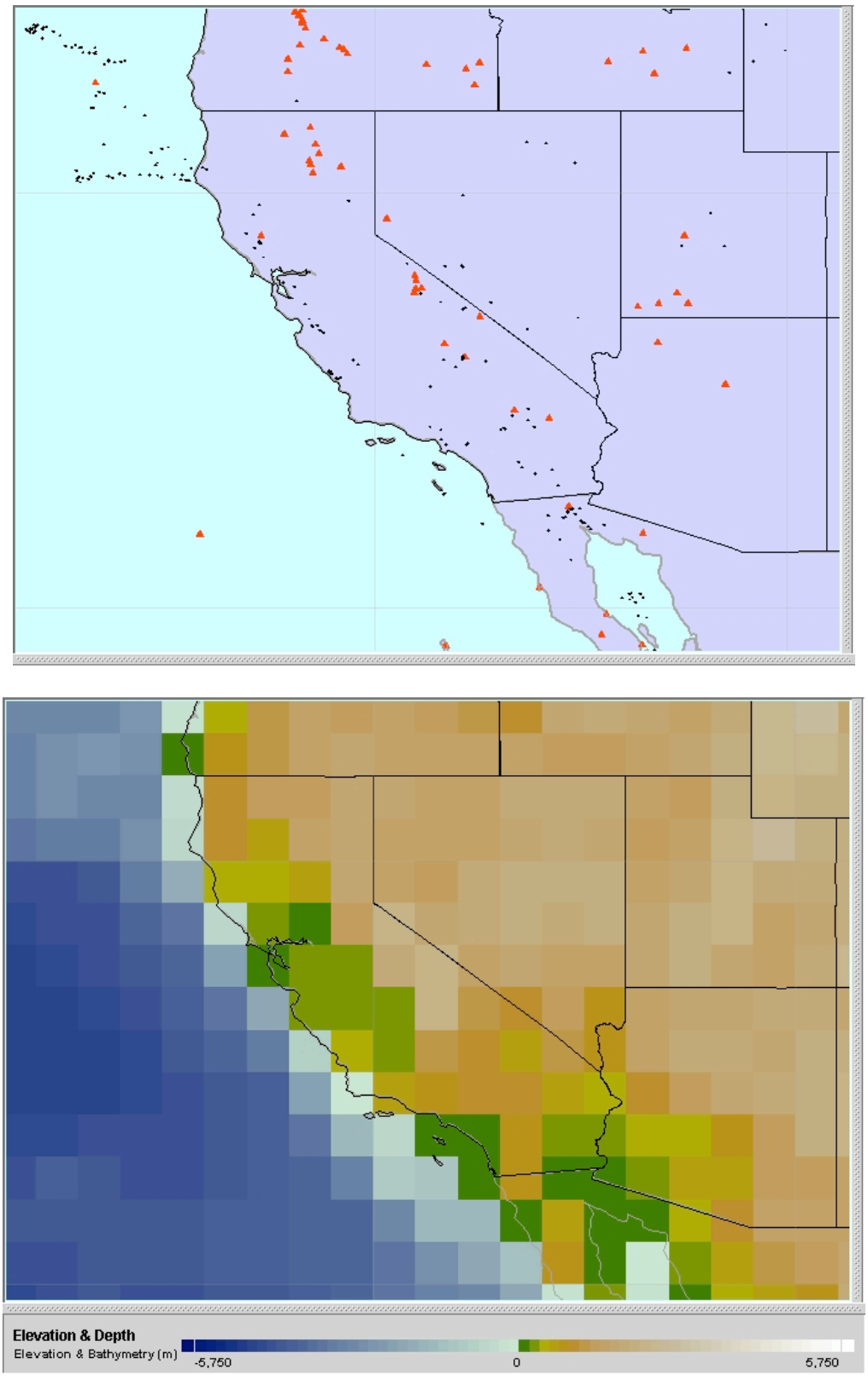


Pattern 3: Describe What You See!





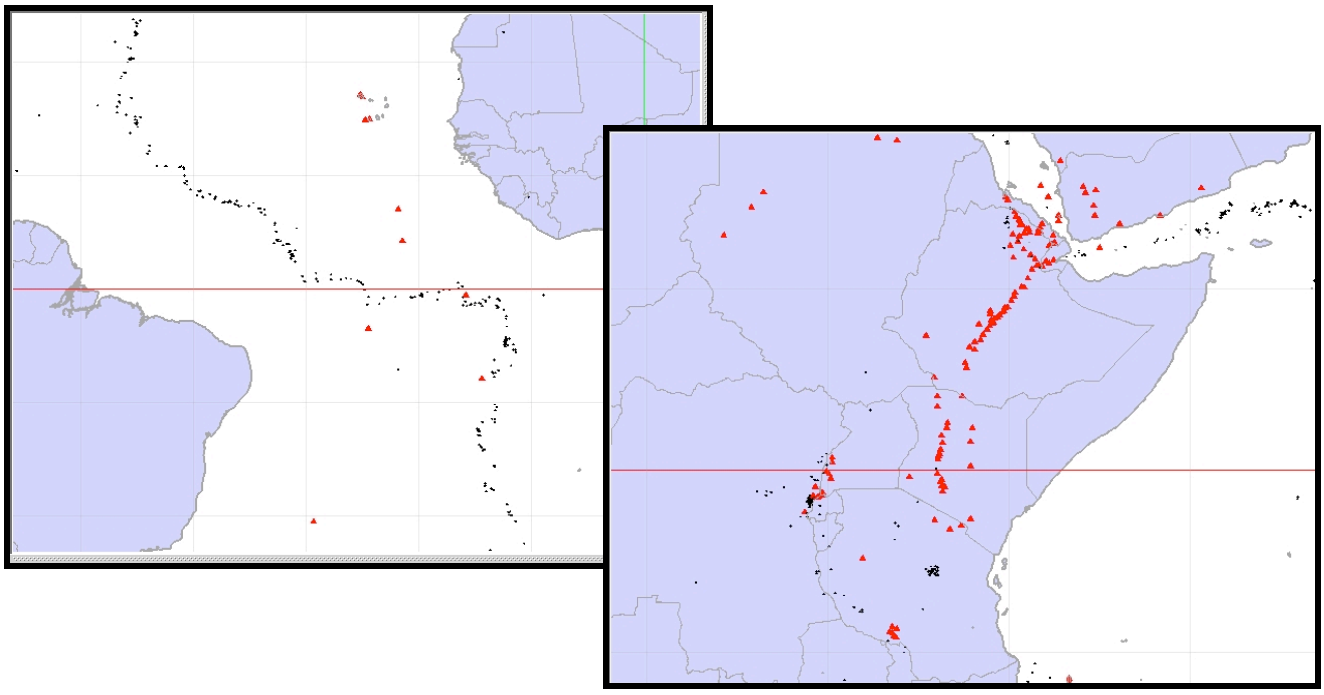
Pattern 4: Describe What You See!

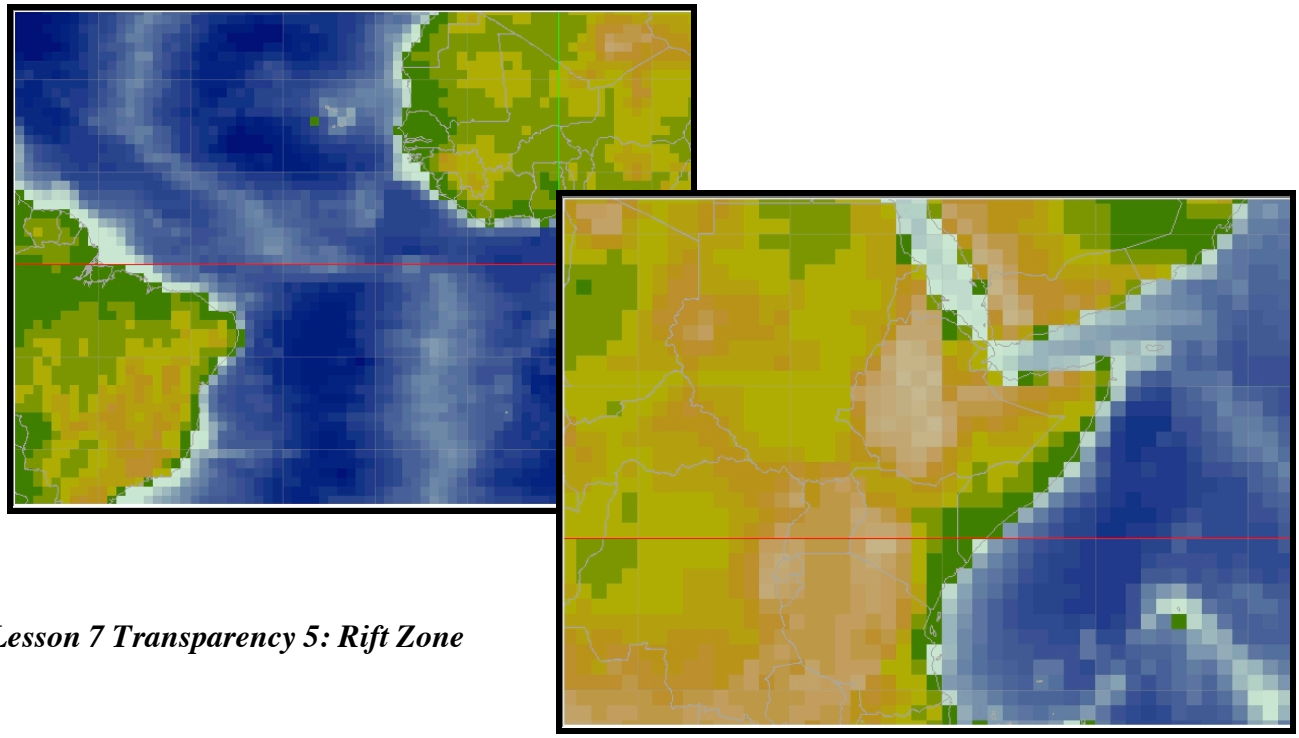


Lesson 7 Transparency 4: Transform Zone

What does the data at a rift zone look like?

- Earthquakes are shallow and small. The data pattern forms a narrow band or line of earthquakes.
- Volcanoes: If underwater, there is a scattering of a few volcanoes near the line of earthquakes. If on land, a narrow band of volcanoes.
- A narrow ridge of volcanic mountains or a narrow ridge of mountains with a valley in between.

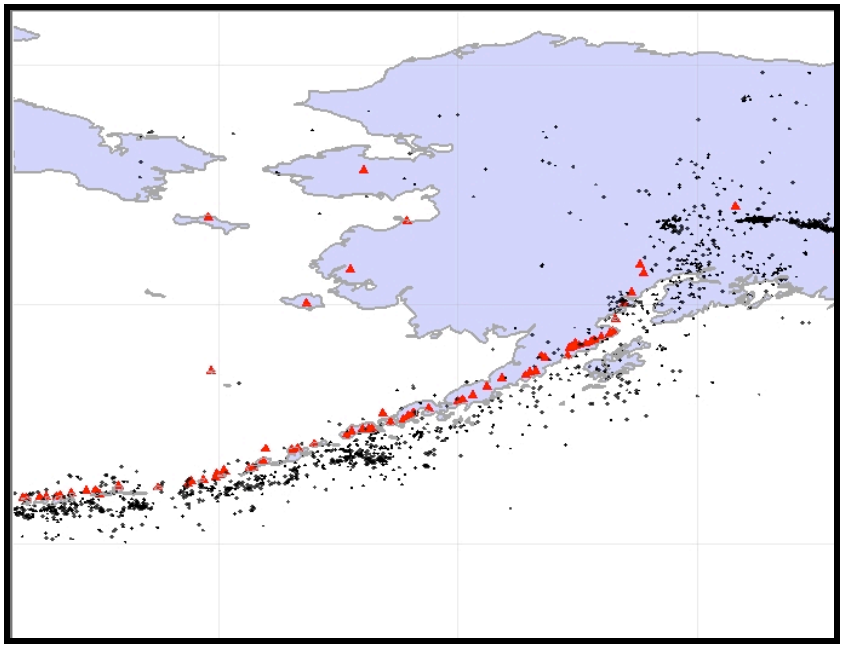


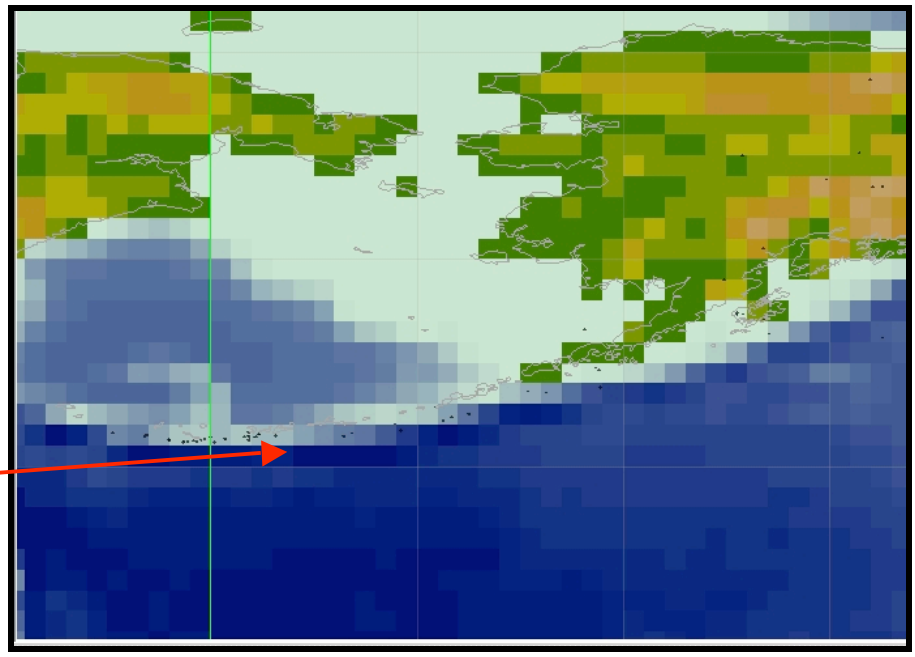


Lesson 7 Transparency 5: Rift Zone

What does the data at a subduction zone look like?

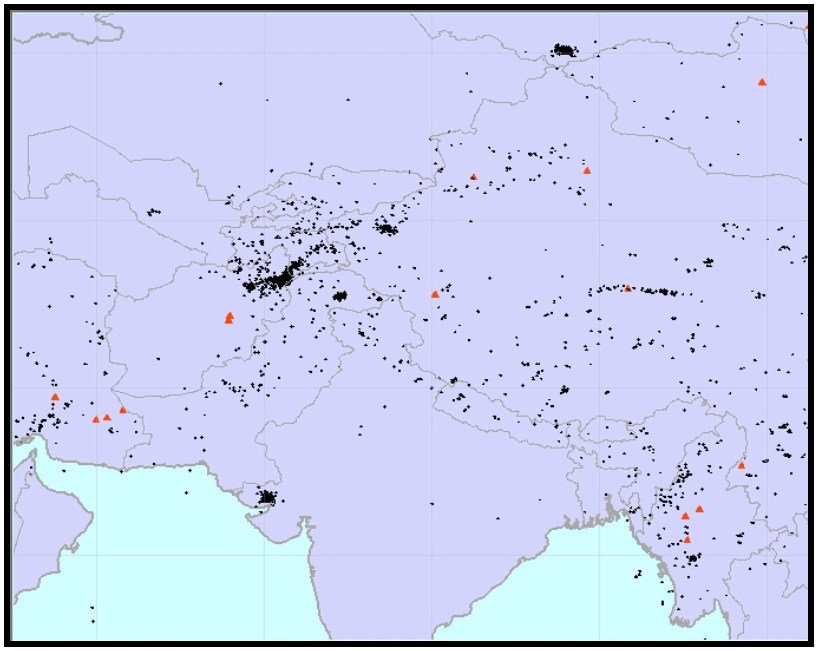
- Earthquakes happen in a clear line.
- Volcanoes happen in a clear line right next to the line of earthquakes.
- Earthquakes generally happen deep below the surface as one plate dives under the other.
- A deep trench is next to a line of steep volcanic mountains.

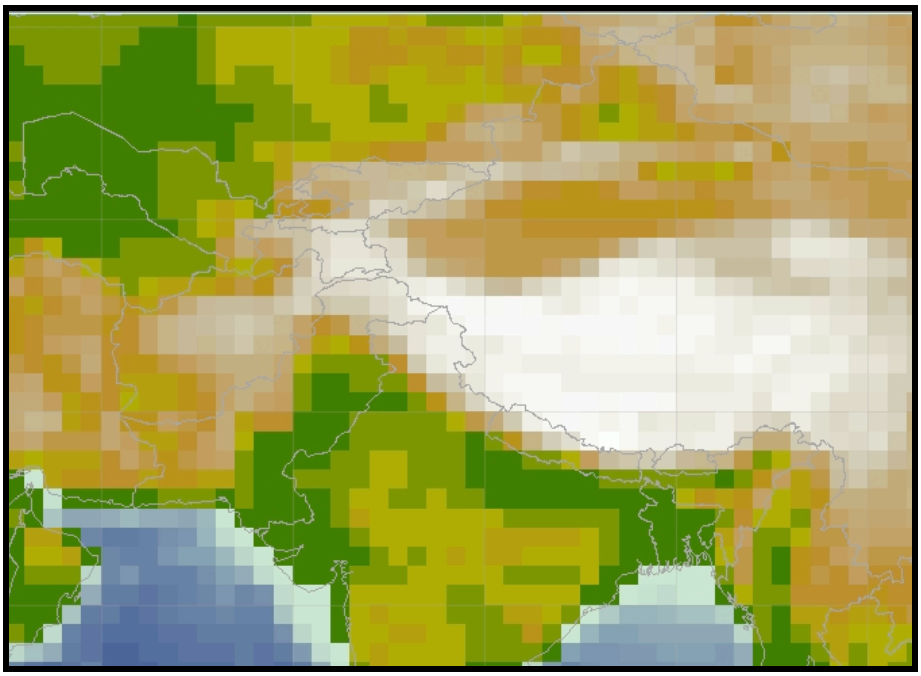




What does the data at a buckling zone look like?

- Earthquakes happen in a scattered pattern.
- Volcanoes are few and scattered.
- Earthquakes generally happen near the surface.
- A large folded mountain range on continental crust.

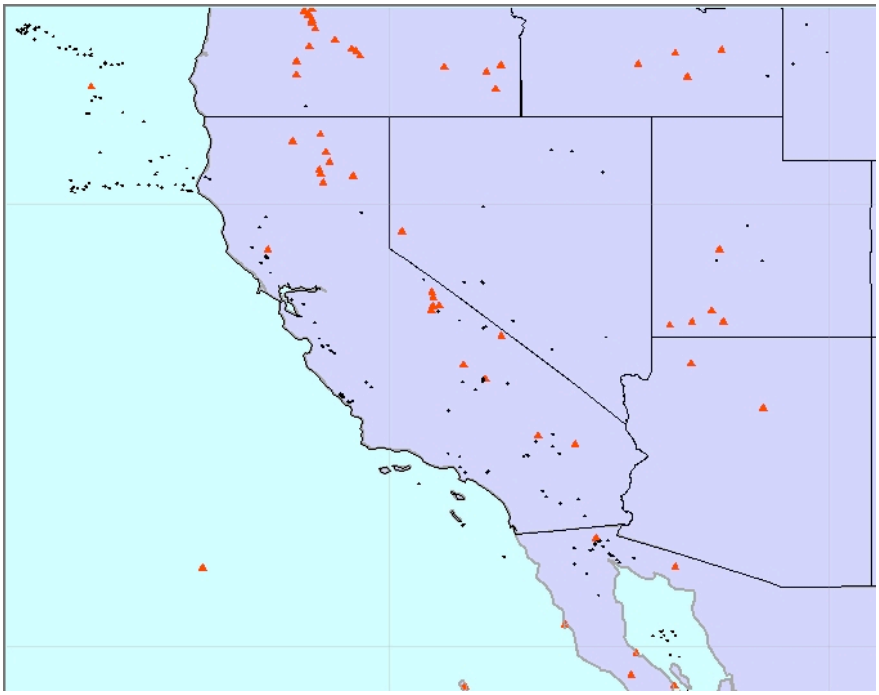


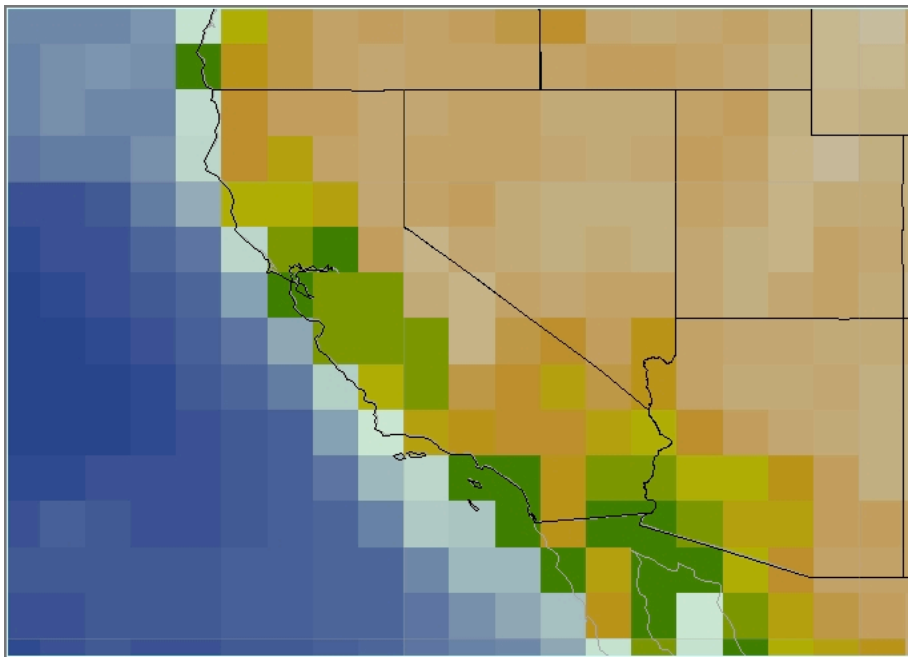


What does the data at a transform zone look like?

Transform zones are difficult to identify from earthquake and volcano data. You can identify all other plate boundary predictions (rift, subduction, and buckling) and then try to predict which boundaries must be transform boundaries.

- Lots of earthquakes that are near the surface
- Volcanoes but in a variety of patterns





National Earth Structure Survey
111 E. Old Trench Road
Washington D.C. 20005

Dear Junior Scientists:

We are very excited about the progress you have made and the patterns you have found. Junior Science Assistants have been keeping us aware of your work and ideas. We would like to look and share the work that you have done with others in the science community. We really look forward to your analysis of the data. There is much debate in the science community about how to analyze the data for a process that takes place over such long periods of time.

In your report we would like to see your identification of the boundary zones and the direction you think the plate is moving. We would also like to know what you think is happening at each earth structure. We would like you to describe the process that is causing the changes at your earth structure. We would also like you to include your supporting evidence and your analysis of that supporting evidence.

We are also preparing for further study so are interested in what questions you have about the processes of Earth's crust.

It has been a pleasure working with you and look forward to your future work.

Keep Rocking and Rolling,

Dr. Seismic P. Wave