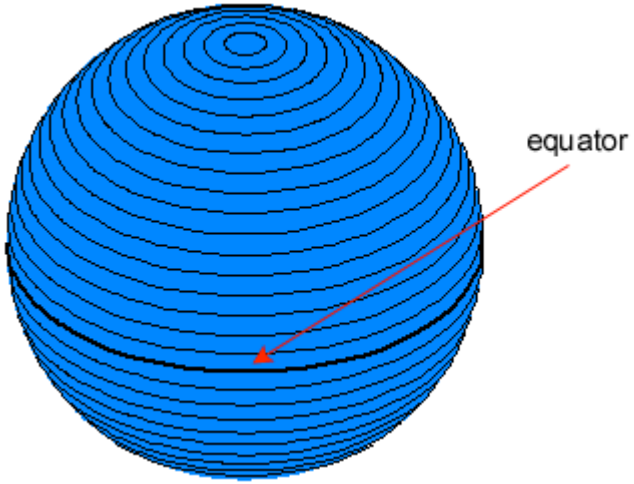
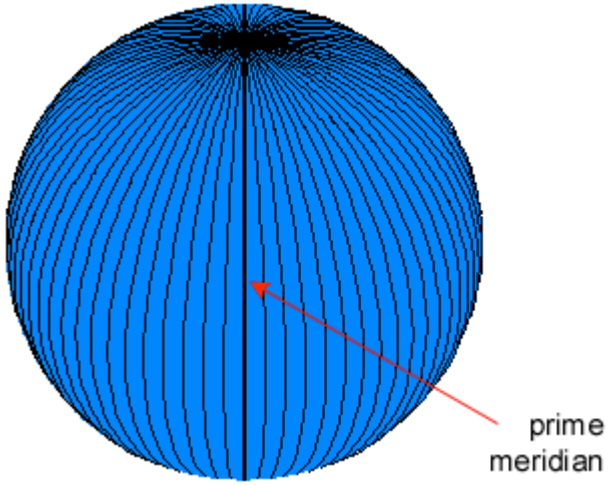
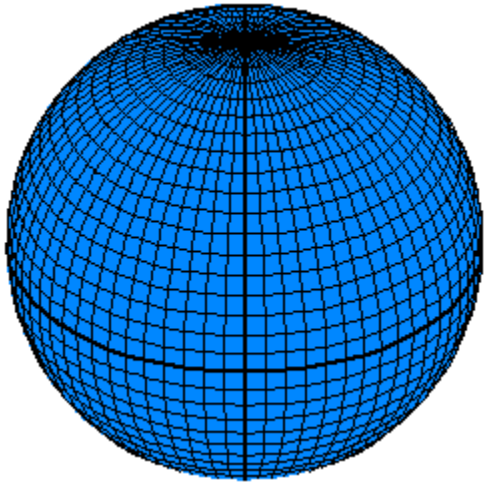
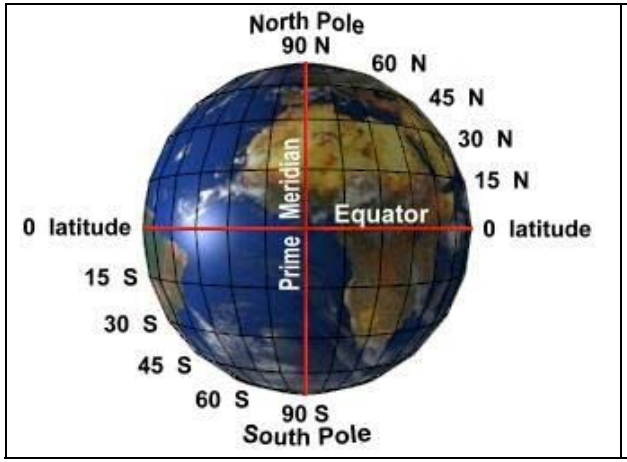
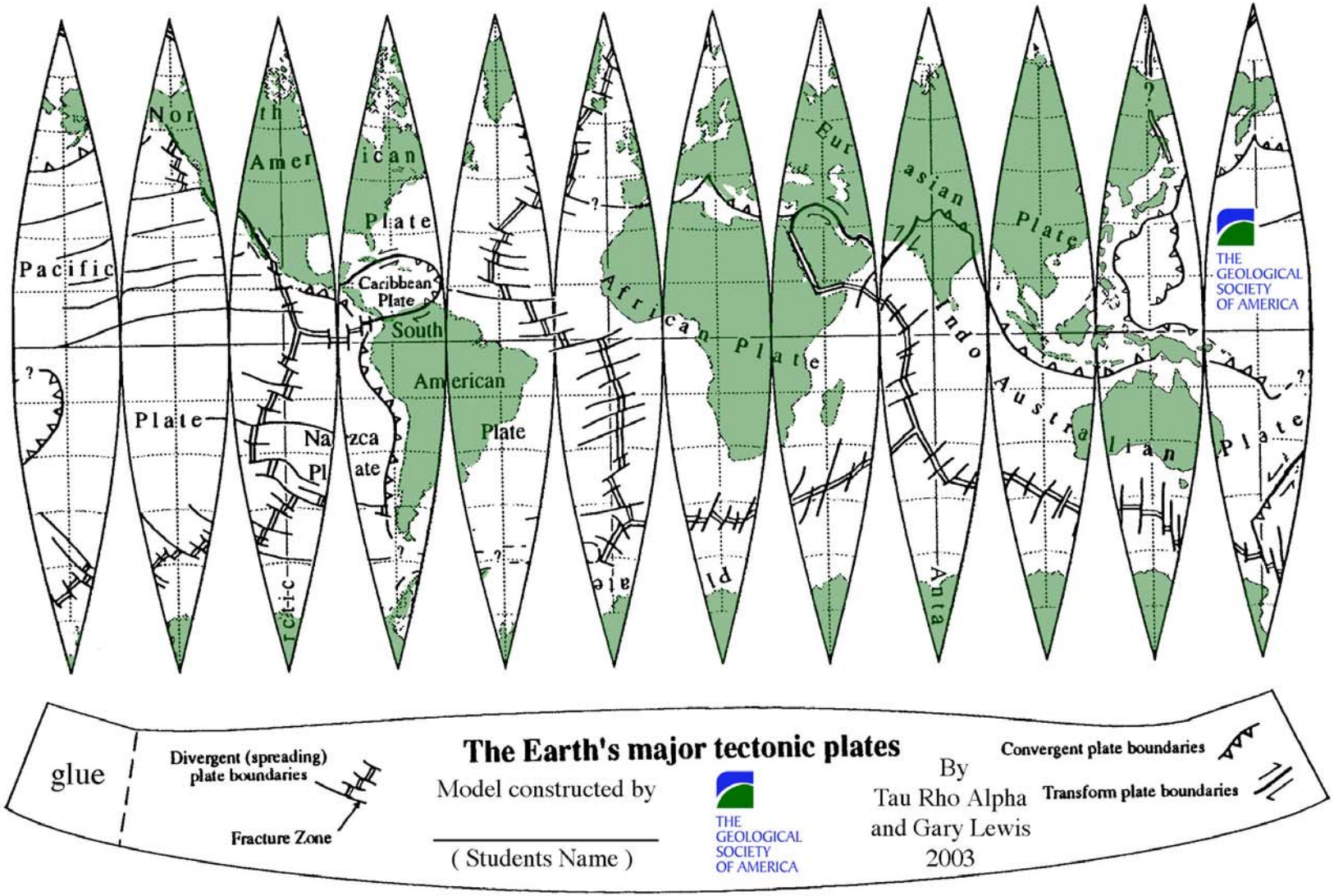
The Earth's Spherical Coordinate System

This lesson is developed as practical exercise to help learn about coordinate systems and graphing. It also introduces students to various projectior of spherical coordinates onto a plane. The Earth's coordinate system (from http://gis.washington.edu/esrm250/lessons/projection/)

		
parallels of latitude (Y)	meridians of longitude (X)	Combined Coordinate System

	Note that the Prime Meridian goes through England.

To become familiar with this system, cut out the pattern below and glue it to a tennis ball.



1, Cut out pattern of map gores
2, Apply glue to the back side of map gores
3, Apply the glued gores to a tennis ball
4, Cut out the base pattern and glue its ends together to form the base

Adapted from: Alpha, Tau Rho, Starratt, Scott W. and Chang, Cecily C., 1993, Make your own Earth and tectonic globes: U. S. Geological Survey Open-File Report 93-380a&b

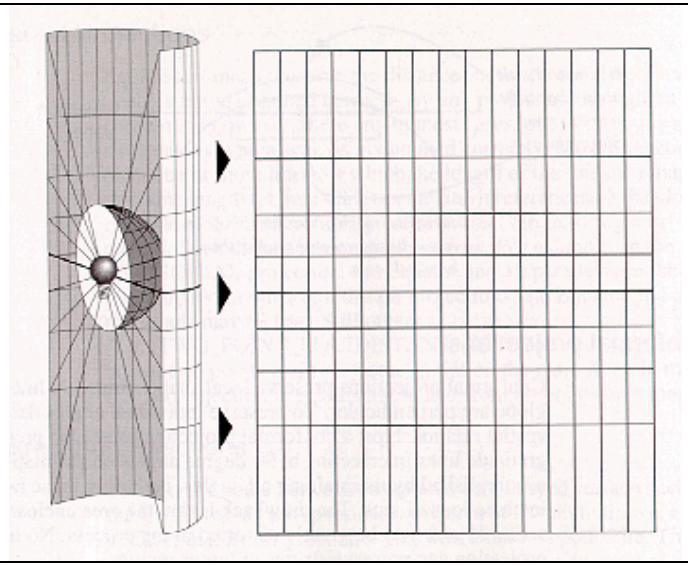
Place these labels on the parallels: 60N, 30N, 0, 30S, 60S, and these on the meridians: 0, 30W, 60W, 90W, 120W, 150W, 180, 150E, 120E, 90E, 60E, 30E.

In order to make a map of the world, the coordinate system must be distorted.

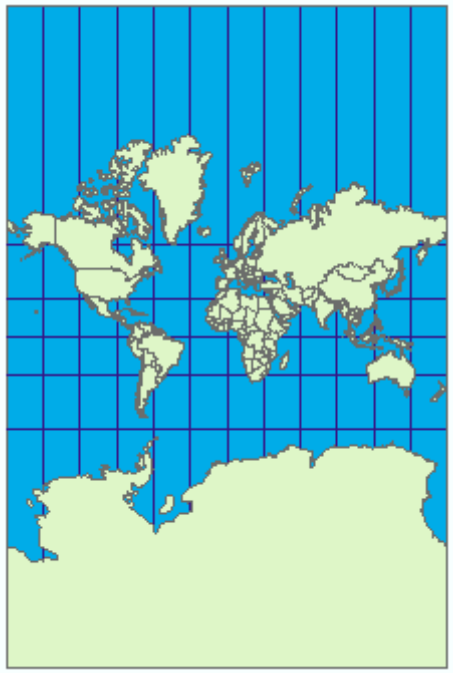
Converting to a planar map is often called “projection” because projecting from within the Earth to a shadow cast upon a surface located around the earth is one possible means of mapping.

In the case of the projection on the right, the north and south poles would be located at infinity!

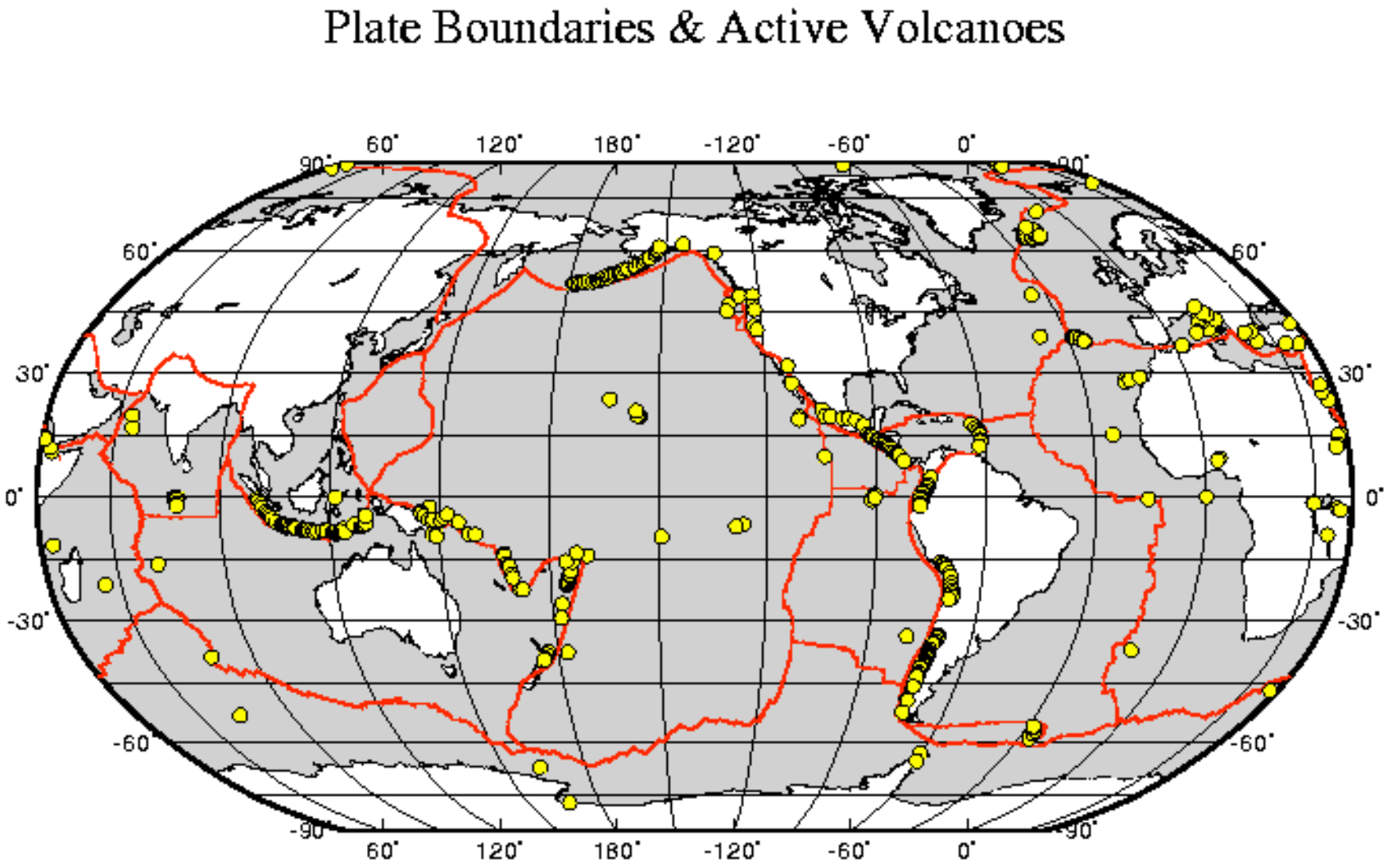
This type of projection is called cylindrical.



The Mercator projection is a type of cylindrical projection. Meridians are parallels are drawn every 30 degrees on this example. Note how distorted the sizes of the land masses are near the poles. Greenland is 1/8th the area of South America but appears to be larger!



The Robinson projection has less distortion of the size of each region.



For practice using the coordinate system, plot the locations of the largest earthquakes since 1900 on both your globe and on the Robinson projection.

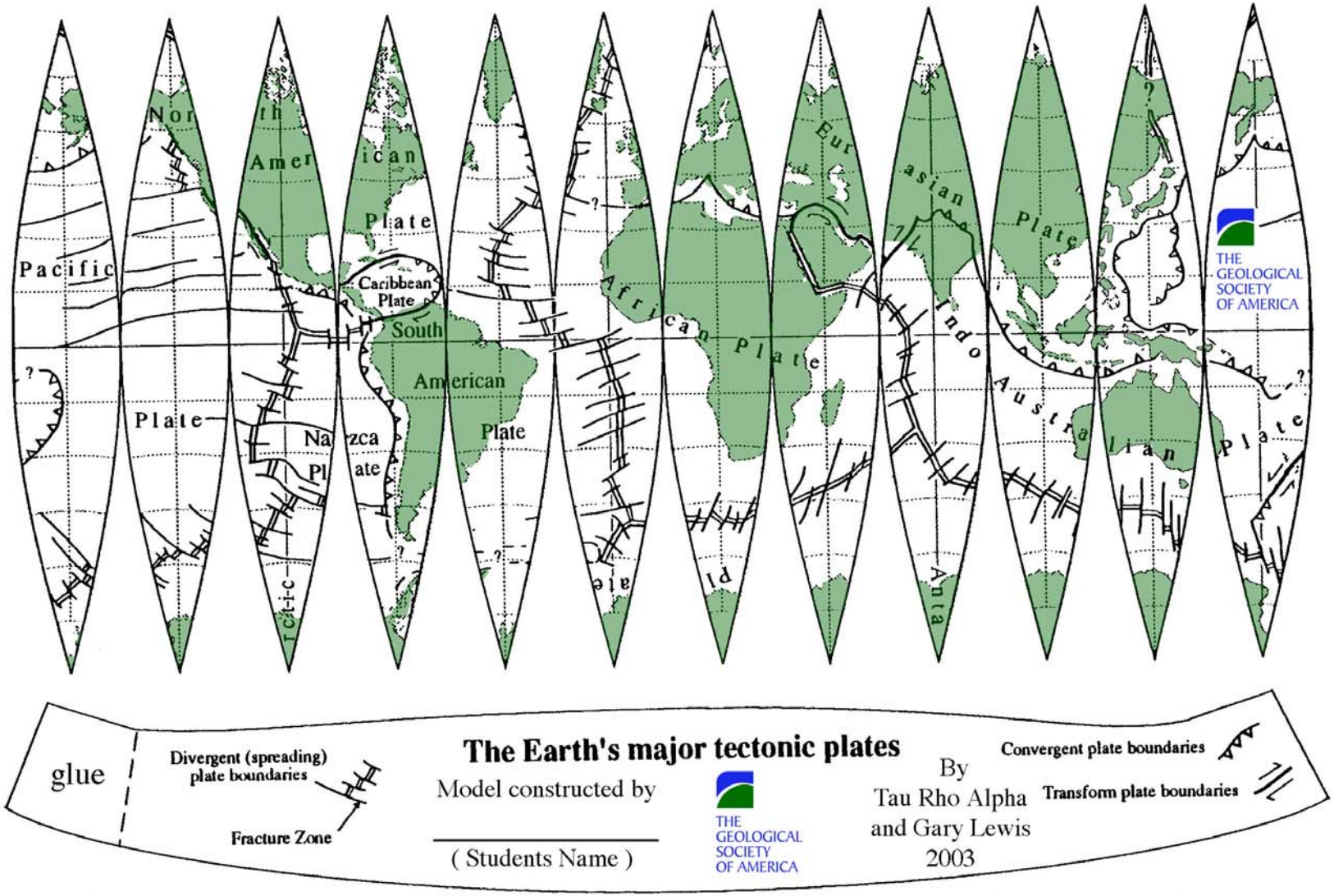
	Location	Date UTC	Magnitude	Coordinates	
1.	Chile	1960 05 22	9.5	38.2S	73.1W
2.	Prince William Sound, Alaska	1964 03 28	9.2	61.0N	147.7W
3.	Off the West Coast of Northern Sumatra	2004 12 26	9.0	3.30N	95.8E
4.	Kamchatka	1952 11 04	9.0	52.8N	160.1E
5.	Off the Coast of Ecuador	1906 01 31	8.8	1.0N	81.5W
6.	Northern Sumatra, Indonesia	2005 03 28	8.7	2.1N	97.0E
7.	Rat Islands, Alaska	1965 02 04	8.7	51.2N	178.5E
8.	Andreanof Islands, Alaska	1957 03 09	8.6	51.6N	175.4W
9.	Assam - Tibet	1950 08 15	8.6	28.5N	96.5E
10.	Kuril Islands	1963 10 13	8.5	44.9N	149.6E
11.	Banda Sea, Indonesia	1938 02 01	8.5	5.05S	131.6E
12.	Kamchatka	1923 02 03	8.5	54.0N	161.0E

Updated 2006 January 25

References:

http://gis.washington.edu/esrm250/lessons/projection/

To become familiar with this system, cut out the pattern below and glue it to a tennis ball.



1, Cut out pattern of map gores
2, Apply glue to the back side of map gores
3, Apply the glued gores to a tennis ball
4, Cut out the base pattern and glue its ends together to form the base

Adapted from: Alpha, Tau Rho, Starratt, Scott W. and Chang, Cecily C., 1993, Make your own Earth and tectonic globes: U. S. Geological Survey Open-File Report 93-380a&b

Place these labels on the parallels: 60N, 30N, 0, 30S, 60S, and these on the meridians: 0, 30W, 60W, 90W, 120W, 150W, 180, 150E, 120E, 90E, 60E, 30E.

The Robinson projection has less distortion of the size of each region.