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IMGIS
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Lab 2

Manipulating Map Projections and Coordinate Reference Systems in ArcMap

Objective: The purpose of this lab was to familiarize myself with how the spherical Earth can be represented as a flat plane. A variety of map projections were utilized across several maps to visualize how map features are distorted in both equal area projection and conformal projection. Latitude and longitude values were also inputted into Projected Coordinate Reference Systems.

Figures:

Figure 1. DiMaioG_Lab2_Map_A_WSG84. This map displays Earth with all its continents using the Geographic Coordinate System WGS84.

Figure 2. DiMaioG_Lab2_Map_B_Cylindrical. This map displays Earth with all its continents using the Projected Coordinate System known as Cylindrical Equal Area.

Figure 3. DiMaioG_Lab2_Map_C_Sinusoidal. This map displays Earth with all its continents using the Projected Coordinate System known as Sinusoidal Projection.

Figure 4. DiMaioG_Lab2_Map_D_GoodHland. This map displays Earth with all its continents using the Projected Coordinate System known as the Goode Homolosine Projection.

Figure 5. DiMaioG_Lab2_Map_E_Mercator. This map displays Earth with all its continents using the Projected Coordinate System known as the Mercator Projection.

Figure 6. DiMaioG_Lab2_Map_F_Robinson. This map displays Earth with all its continents using the Projected Coordinate System known as the Robinson Projection.

Figure 7. DiMaioG_Lab2_Map_G_Fuller. This map displays Earth with all its continents using the Projected Coordinate System known as the Fuller Projection.

Figure 8. DiMaioG_Lab2_Map_H_Rowan-centric. This map displays Earth as a round sphere using the Projected Coordinate System known as the Azimuthal Equidistant Projection which has been centered on the location of Rowan University.

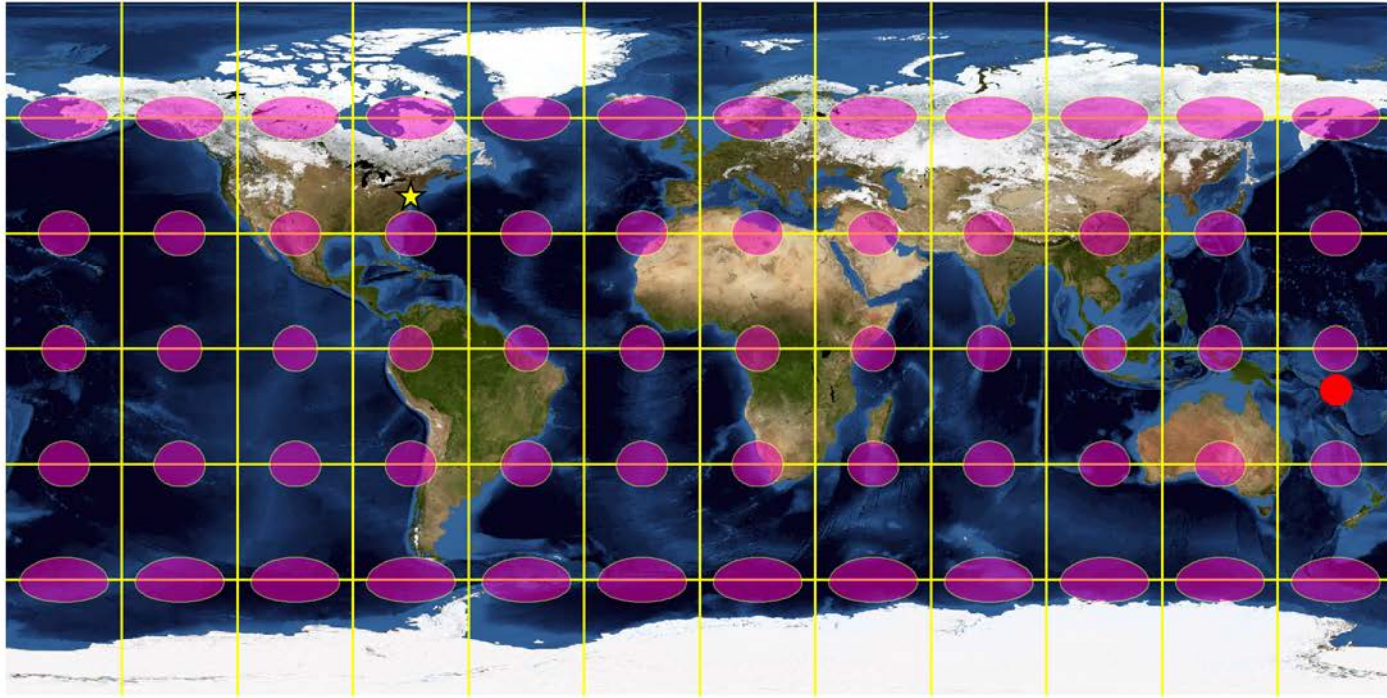
Figure 9. DiMaioG_Lab2_Map_I. This map displays Earth as a round sphere with all its continents using the Projected Coordinate System known as the Azimuthal Equidistant Projection centered on the location of the Santa Cruz Quake of 2/6/2013.

Figure 10. DiMaioG_Lab2_Map_J_North-America. This map displays 4 data frames displaying the Contiguous US, Alaska and Hawaii, and the whole Earth using appropriate Coordinate Reference Systems for the best appearance.

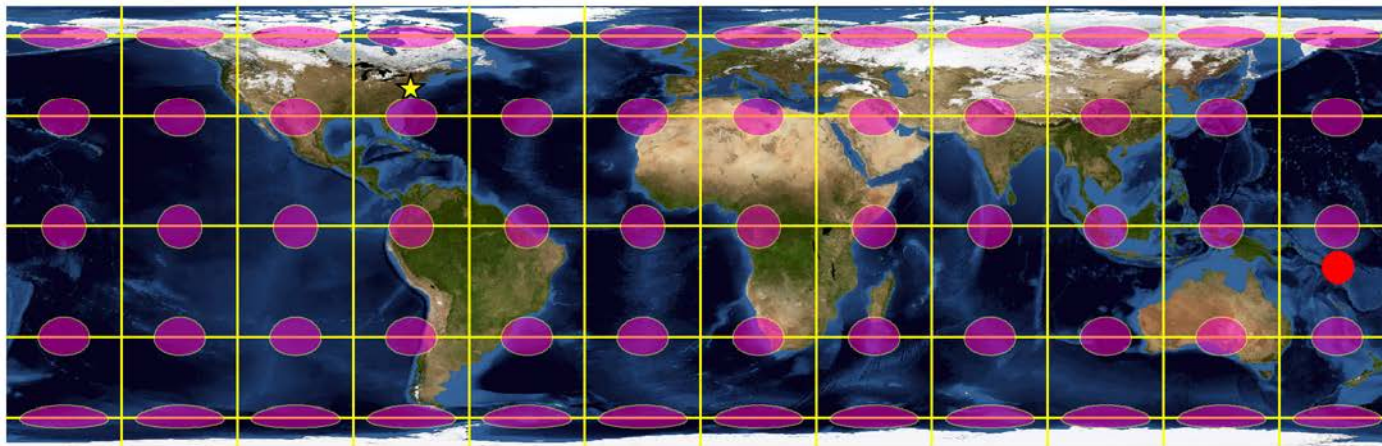
Questions:

1. Map A using WSG84 is a global system that represents the world and its normal system of latitude and longitude; distortion appears as you move away from the equator. Map B uses the Cylindrical Equal Area projection that distorts shapes even more so than Map A and Antarctica has seem to have disappeared. Map C uses Sinusoidal Projection which disorts the shapes very dramatically as the poles are somewhat cone shaped, both the Tissot's Indicatrices and continents are elongated but this map perserves the relative area. Map D uses Goode Homolosine Projection which perserves the relative area with minimal distortion but with space omitted inbetween - the appearance of the continents look quite nice. Map E is of the Mercator Projection that is excellent at preserving the relative direction of locations on Earth but distorts the area as you more toward the poles. Map F of the Robinson Projection is aesthetically pleasing with little distortion but compromises both distance and direction of relative shapes. Map G is very bizare as the map appears as a very irregular polygon shape however the Tissot's circles are very uniform and size and the continents seem to be accurate in size in relation to one another. Map H uses Azimuthal Equidistant Projection and preserves directions and distances from a single point (Rowan University), however as you move away from this point the continents become increasingly distorted.
1. In Map H which is centered on Rowan University, the distribution of earthquakes appear quite differently than those in Map I. Map I reveals the large number of earthquake occurances in the proximal area of the Santa Cruz Quake as these other quakes nearby look like a string of beads on the map. This view of those quakes is something that is lost in Map H which alternatively shows a different view of the pattern of earthquakes which make up the "Ring of Fire" as well as the number of quakes that appear near the North Pole and elsewhere.
2. The regional equal-area projections for the sections of the US benefit the appearance of the combined map as each individual data frame displays the equal area of each section most attractively. In area of these sections no distorton occurs as we have told the software how best display each location that is being focused on. In each of these maps the relative area shape and size are maintained. This is especially obvious in the map of the Continguous United States as how the states relate to each other and in the map of The World in the corner of the combined map which most attractively displays United States on the globe and within North America.

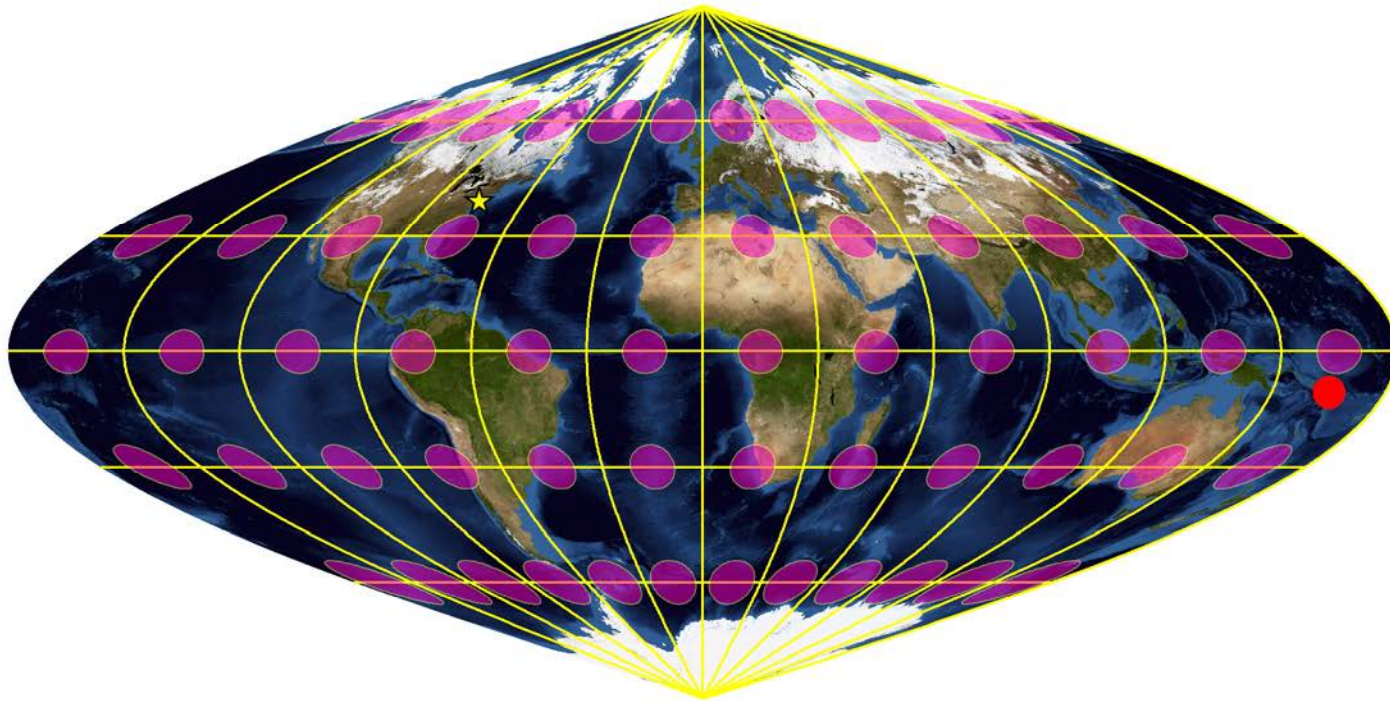
Geographic Coordinate System, WGS84



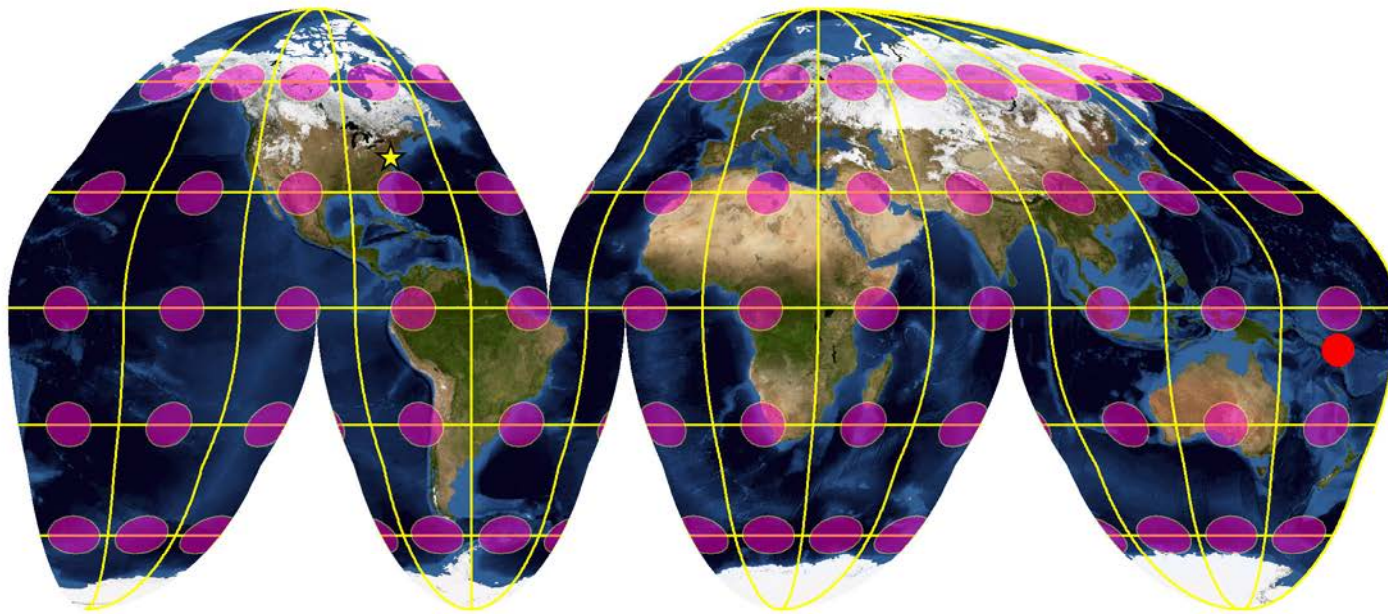
Cylindrical Equal Area Projected Coordinate System



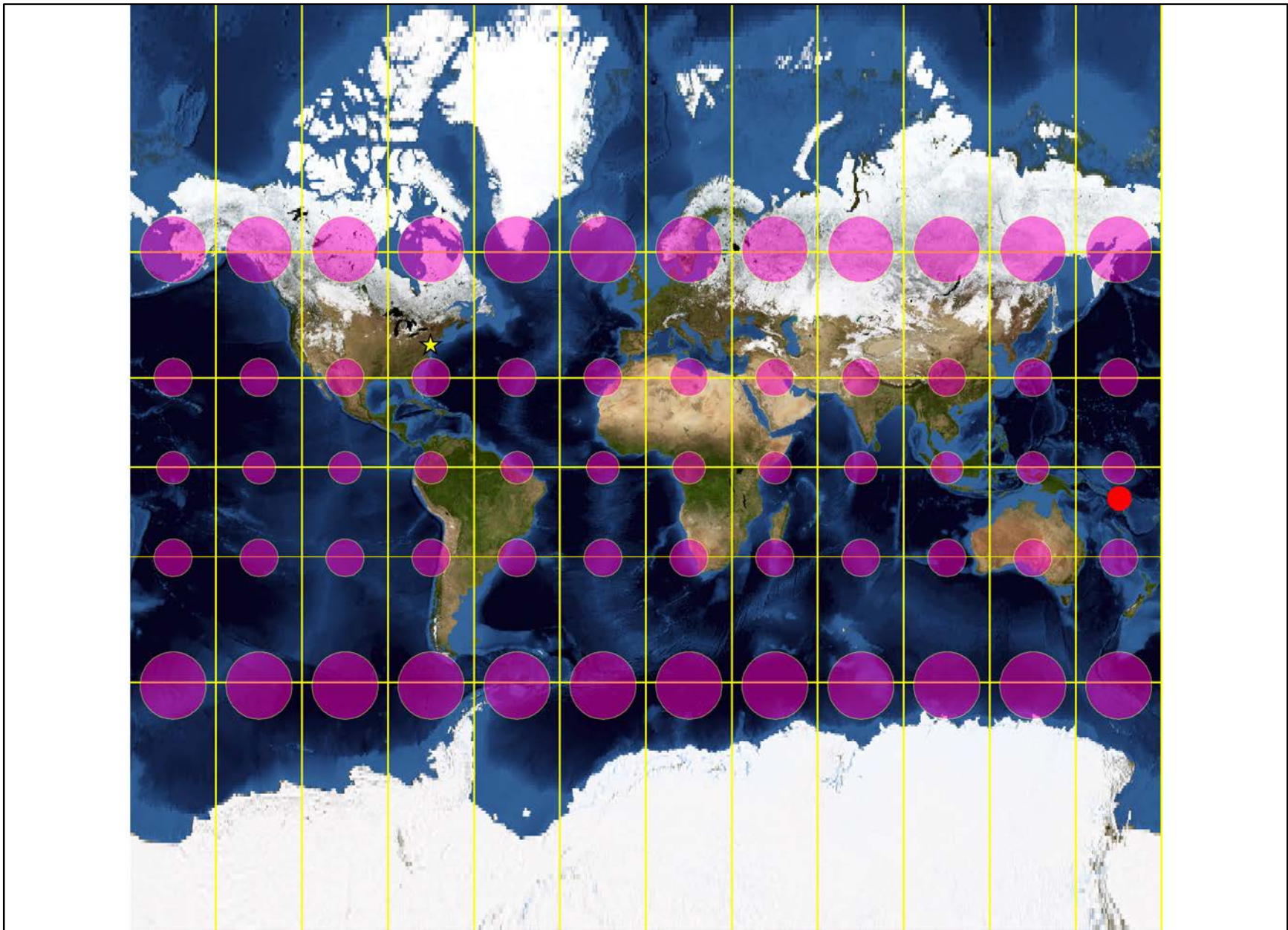
Sinusoidal Projected Coordinate System



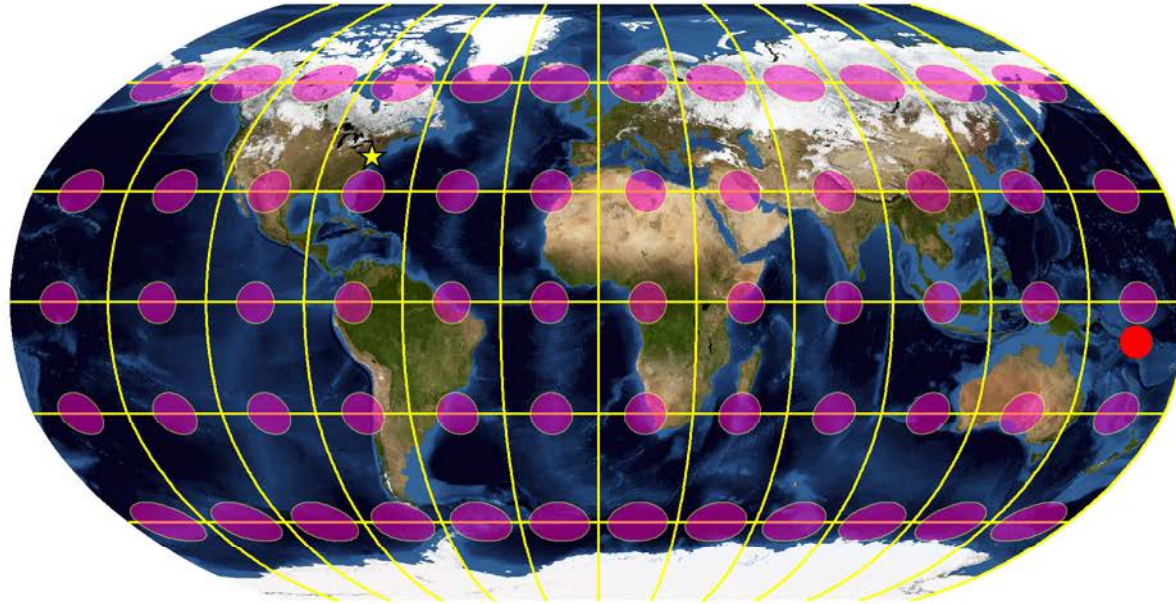
Goode Homolosine Projected Coordinate System



Mercator Projected Coordinate System

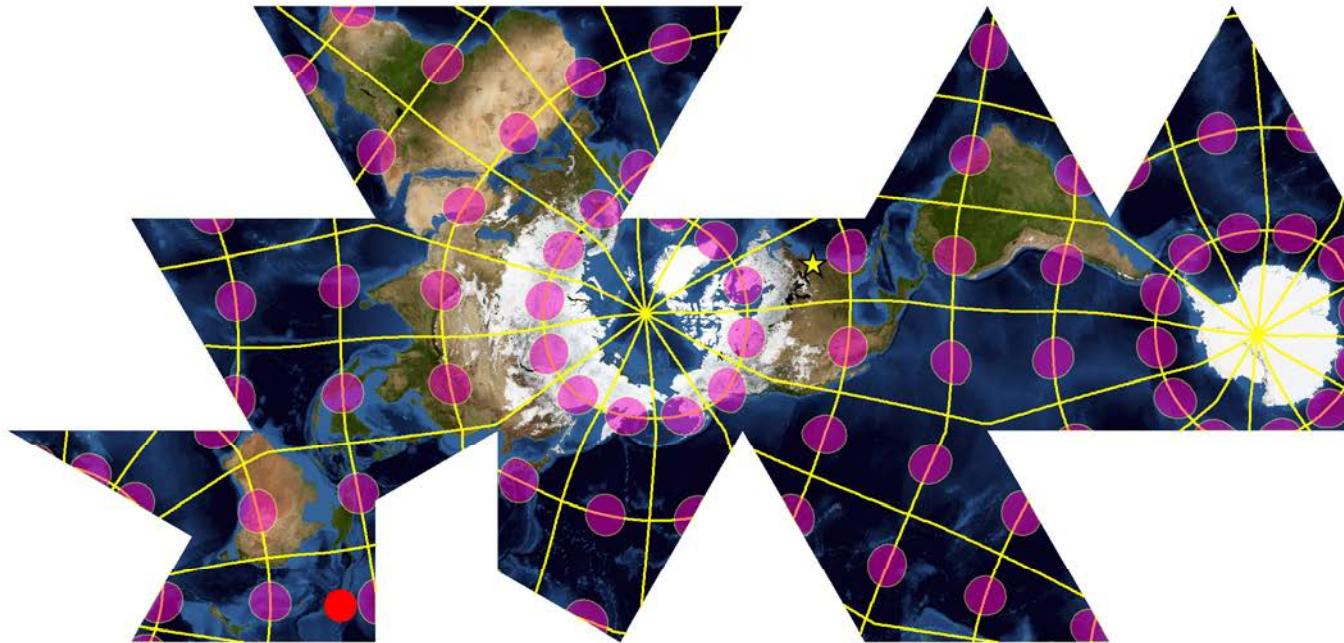


Robinson Projected Coordinate System

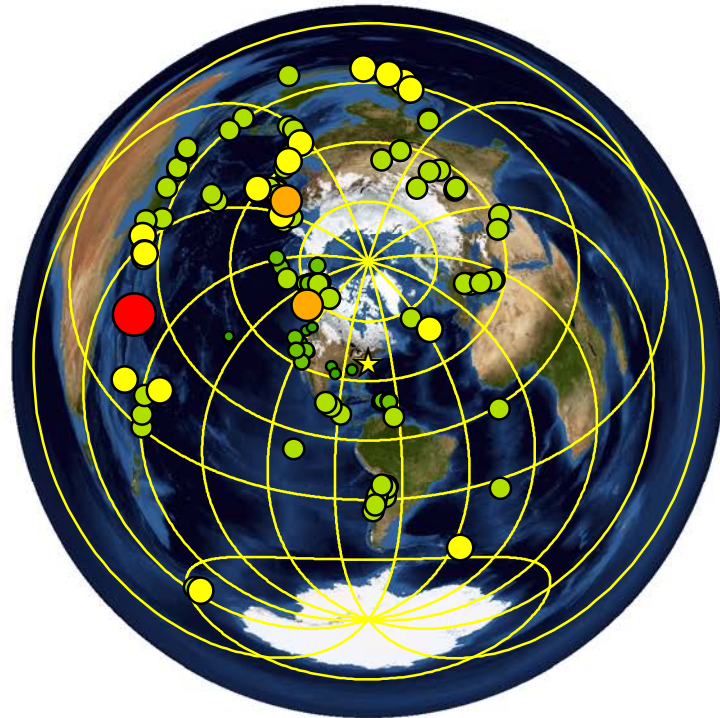


Fuller Projected Coordinate System

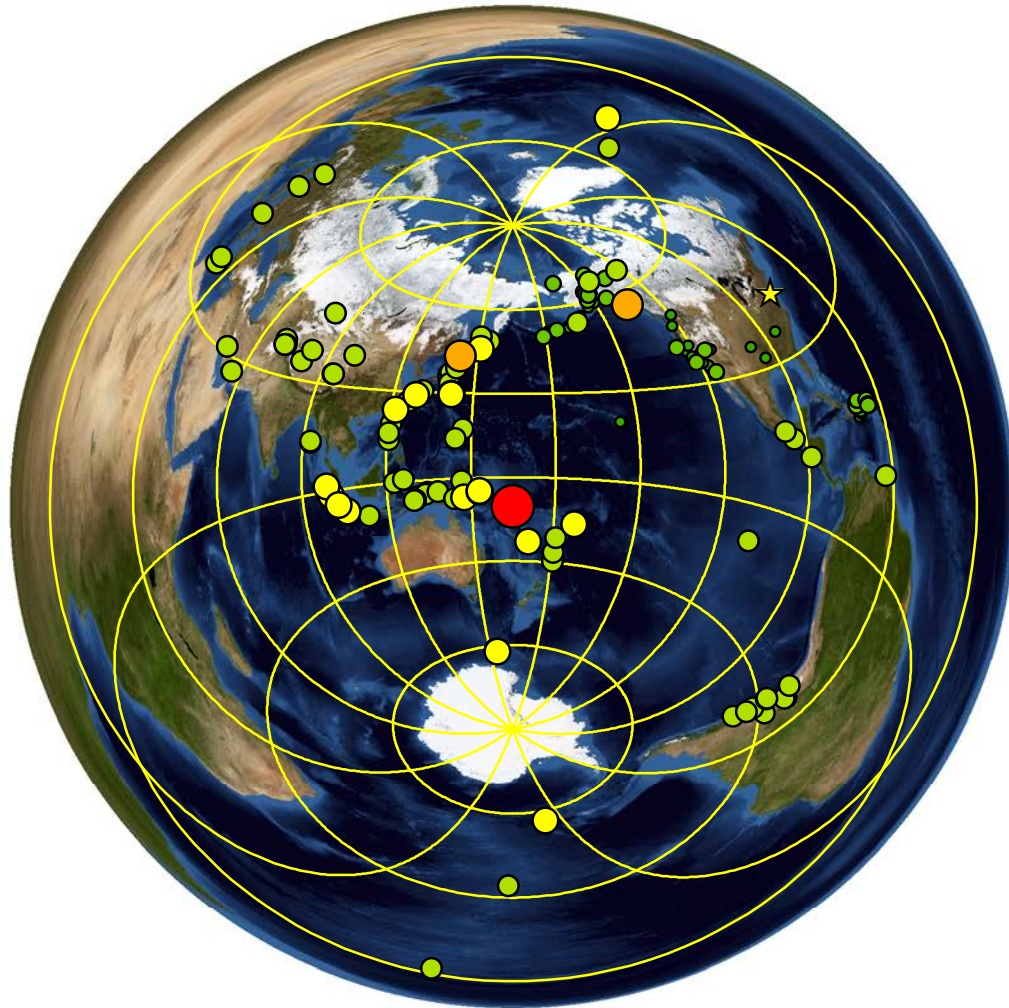
Conformal projection as the shapes/sizes of the continents appear accurate. Also, the Tissot's circles are mostly round and uniform in size.



Azimuthal Equidistant Map Centered On Rowan



Santa Cruz Earthquake, 2/6/2013



Map of the United States Within the World

