# Plate Motions Project

Use the Isochron Map (attached jpeg file) to answer the following questions.  Recall that seafloor isochrons reveal the positions of divergent (ridge) boundaries in earlier times.

**Part I - Atlantic Ocean**
1. When did the North Atlantic Ocean first start to open?
2. Where is the oldest oceanic crust found in the Atlantic?
3. Has the rate of opening of the North Atlantic ocean changed over time or remained fairly constant?
4. When did the South Atlantic Ocean first start to open?
5. Contrast the rate of opening of the North and South Atlantic.

**Part II - Pacific Ocean**
1. The oldest oceanic crust off the coast of South America is about 60 m.y. old.  The oldest oceanic crust off the coast of the Phillipines is about 200 m.y. old.  If the East Pacific rise is creating this oceanic crust in a symmetric pattern, then what happened to the old oceanic crust in the eastern Pacific?
2. The boundary between the North American Plate and the Pacific plate is currently a transform fault (San Andreas fault).  The evidence in the isochrons indicates that the plate boundary was different in the past.  What type of plate boundary or boundaries existed in the past?  How do you know this?  When did the change in plate boundaries occur?

**Part III - Reconstruction**
1. Make a copy of the isochron map (Black and White is OK) and remove seafloor that is less than 40 Ma (Red and Orange color).
2. Make a reconstruction of the Earth at 40 Ma by putting the remaining map pieces back together at the ridge boundaries assuming that Antarctica is stationary.  Remember that the Earth isn't getting smaller so there will be gaps in your reconstruction representing subducted lithosphere.  Also keep in mind that some plate boundaries from 40 Ma do not exist today.  So you may need to cut your map into more pieces in order to get everything to fit together.
3. What does the reconstruction tell you about the relative (to Antarctica) motion of the continents and the plate boundaries?  Can you suggest another frame of reference for the reconstruction?  Why?