

SIO160 Homework 3 Due next Thursday April 24th

Read Tanya Atwater's classic 1970 paper (Implications of Plate Tectonics for the Cenozoic Evolution of Western North America; GSA Bulletin v. 81, p. 3513-3536) and answer the following questions:

1) Atwater discusses two fundamentally different models for the interaction of the Pacific plate with North America:

What is the basic difference in the models?

Which model did she favor in her 1970 paper?

Based on her recent animations, does she still favor that model? (you can download the animations from the class website)

2) When did the Pacific-Farallon ridge first collide with North America?

When was there last a trench off of Baja California?

How fast was the Farallon plate being subducted beneath North America before the ridge collided with the trench?

How recently was there an active trench west of San Francisco?

3) What is the origin of the Rivera plate?

Which plate does it appear to be coupled to?

Where does the 6 cm/yr rate for the present motion of Pacific-North America motion come from?

4) In her calculation of the motion of the Juan de Fuca plate relative to North America she solves a slightly different velocity triangle than I did in class for the Mendocino Triple junction.

What transform fault did she use instead of the Mendocino transform fault?

And, most importantly, why?

5) Which model does the Paleomagnetism data support and why?

6) How much time elapsed between the last active subduction at the trench off of Baja California and the onset of spreading in the Gulf of California?

Where did Atwater place the motion between the Pacific plate and North America during this time interval?

Does Atwater still place it there? (See her animations)

7) There is evidence for motion on the San Andreas fault in the early Cenozoic, long before the collision of the Pacific plate with North America. How does Atwater account for this in her model?