Quiz 2: The Interior of the Earth (Ch. 2)

1. Explain (using sketches if you wish) the observations that led to Mohorovičić's discovery of the crust-mantle boundary.

at some distance from the source, the mantle-path P wave overtakes the direct p-wave. this requires a faster layer at depth. Answer must describe some observations made by Mohorovičić, not other subsequent observations of the moho.

2. What are the lithologies found in an (idealized) ophiolite? Which seismic velocity layers of oceanic crust have been correlated with which lithologies?

sediments (could name some, any marine will do): Layer 1
Volcanics (pillows, flows, ash) Layer 2
intrusives (gabbro, cumulate etc.) Layer 3

3. In 1855, Pratt and Airy suggested models for depth-elevation relationships on earth using a model of crustal blocks floating in the mantle. What essential property of the lithosphere is not considered in this type of model?

elastic strength, tensile strength, flexural rigidity. These models had crustal blocks freely compensating independently no matter their scale - in fact, elastic strength is important and decouples density/thickness from elevation where there are changes in these attributes on short length scales.

4. A focal mechanism plot displays the areas of compression and tension detected in the seismic wave arrivals at a station after an earthquake. This is the focal mechanism for the Jan 20, 2014 M6.2 earthquake which occurred on a fault in the extensional region of the north island of New Zealand. Which is the better focal plane solution? Give the (approximate) strike and dip of the fault which slipped during the earthquake. Justify your answer.

should be something like 040/75NW (lots of leeway on exact values). shows normal motion. Half credit for accurate orientation given for wrong plane.