

Problem Set 3: Seismic sources and waves

1) How would you distinguish between the P-wave, S-wave, Love and Rayleigh wave by looking at a three component seismogram recorded 50 degrees from a magnitude 6.7 earthquake?

2) What is the wavelength of a surface wave with a period of (a) 10 s, (b) 100 s and (c) 200 s? Comment on the use of surface waves in resolving small-scale lateral inhomogeneities in the crust and mantle.

3a) Calculate the amount by which the seismic energy released in an earthquake increases when the surface-wave magnitude increases by one unit.

b) The daily electrical consumption of the U.S.A. in 2001 was about 9.9×10^9 kilowatt hours. If this energy was released in an earthquake, what would its magnitude be? If the US energy consumption for the entire year was released in a single earthquake, what magnitude would it be?

4 The attached figures (a) and (b) show the directions of first motion observed for two earthquakes. (a) an earthquake in Iran, and (b) an earthquake in the Eastern Atlantic. Solid dots are compression (positive), open circles are dilatation (negative) first motion. An equal-area (Schmidt) net is also attached (c). For each earthquake do the following:

a) Draw the two perpendicular planes that divide the focal sphere into positive and negative regions.

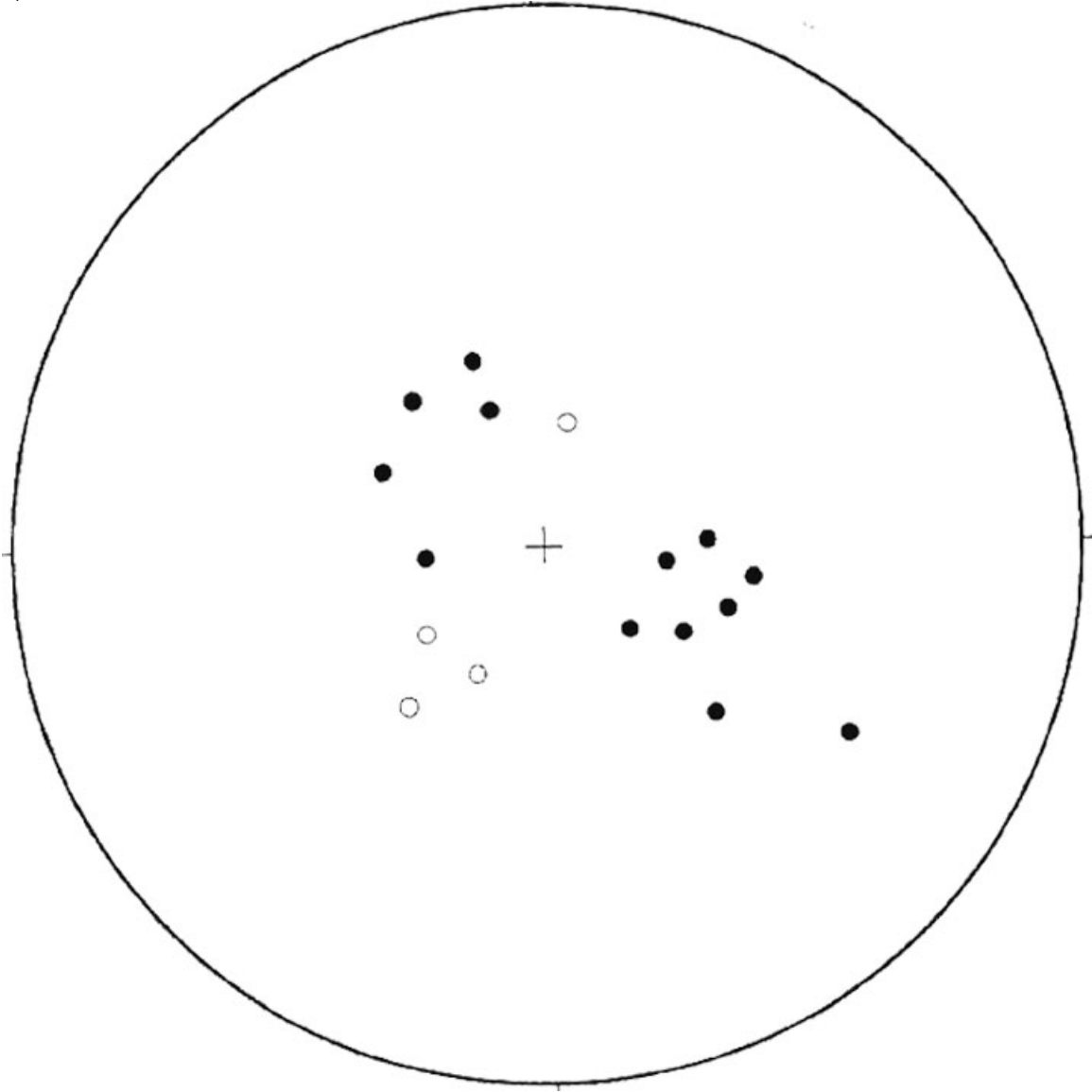
b) Find the strike and dip of these planes.

c) Plot the horizontal component of slip.

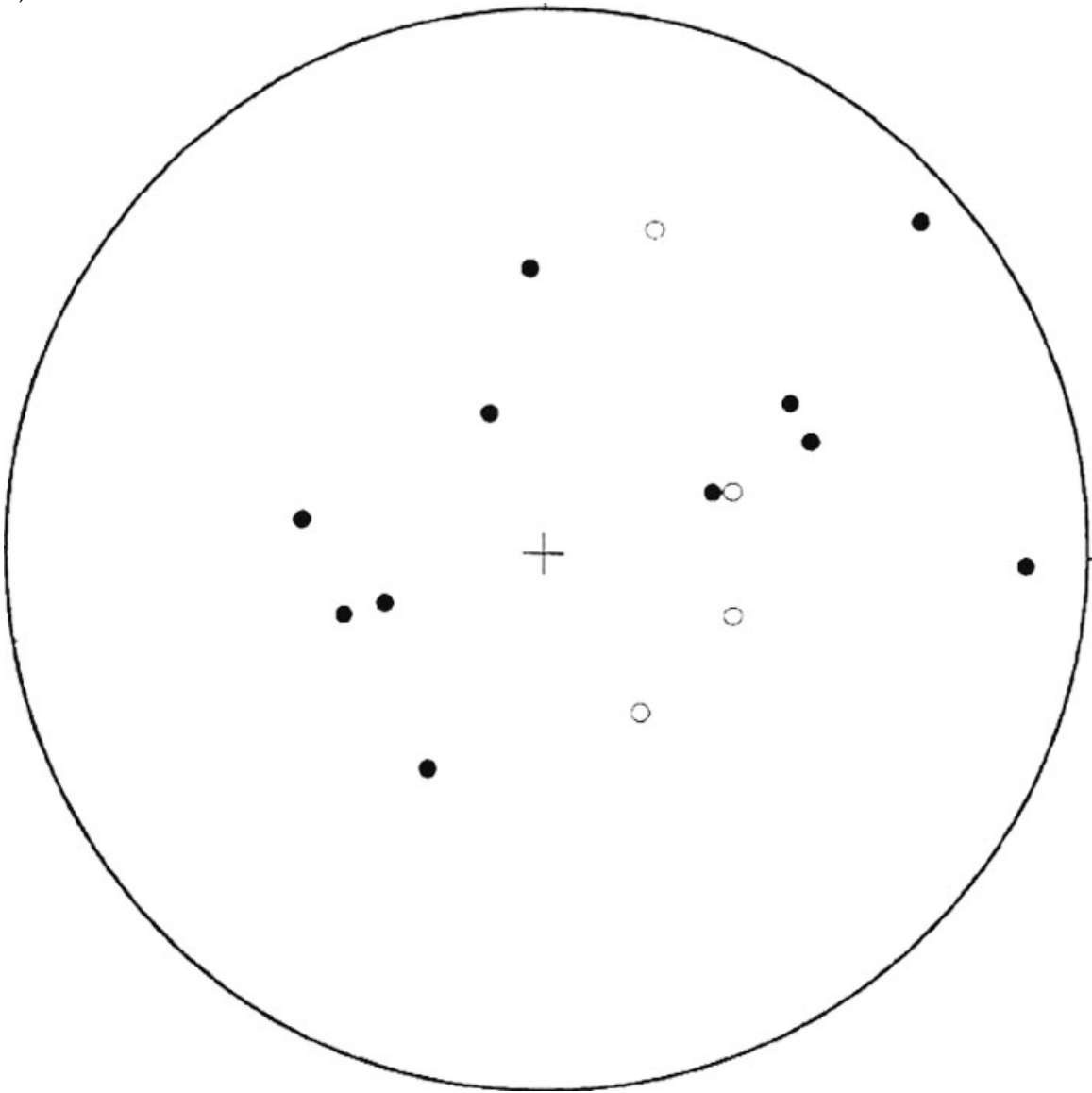
d) Discuss the mechanism of the earthquake.

Hint: Take a look at the examples in Fowler p136-140.

a)



b)



c)

