12.103 – Science and Policy of Natural Hazards

Problem Set #3: Volcanoes   Due date: May 7, 2010

1- Melting of mantle rocks. (a) What is decompression melting? (b) What type of volcanism is associated with decompression melting? (20 points)

2- Volcanic energy. (a) What are the means by which volcanic energy is dissipated? (b) Is it possible to estimate the energy release of a prehistoric eruption and, if so, how is this done? (c) The large plinian eruption of Mt Pinatubo had a volcanic magnitude of 6.0, with an energy release of 10^{19} J over a period of ~24 hours.   In comparison, the magnitude 6.9 Kobe earthquake released ~10^{15} J through a fault rupture that lasted ~10 s. How do these two events compare in terms of power output? (30 points)

3- Policy: Suppose you are hired as scientific advisor to the mayor of San Angeles, a fictional mega-city on the southwestern coast of California. Being a fan of Hollywood blockbusters, the mayor has seen both "Earthquake" and "Volcano", and wants to split the Natural Hazard Management budget of the city evenly between volcano and earthquake hazards. (a) In a brief statement aimed at a scientist, explain why this is not a good idea. (b) In the form of a one page letter or memo, show how you would communicate your main reservations regarding this strategy to the mayor, who is not a scientist. (50 points)

12.103 Science and Policy of Natural Hazards
Spring 2010