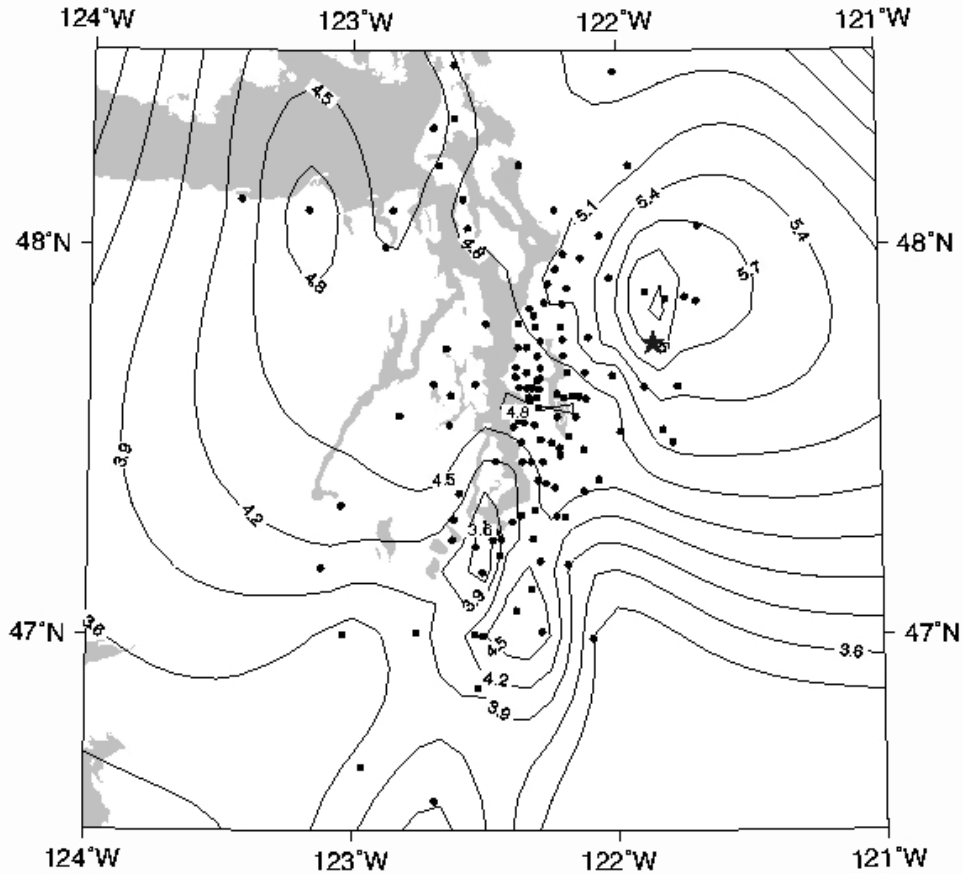


1. (30) In late February 2001, a major earthquake struck the Seattle, Washington area. The map below shows the *modified Mercalli scale intensity contour map*. (The contour interval is 0.3 Mercalli units; Seattle lies in the area of the greatest number of control points, near the center of the map.). The star shows the approximate epicenter of the earthquake.



a. How does earthquake “intensity” differ from “magnitude”? Explain *in detail* how these two characteristics of an earthquake are **measured**.

b. Use the map and the equation we discussed in class [$M_b = (I_{max} + 4.6) / 2$] to estimate the body magnitude of the earthquake.

c. The *actual* magnitude for the quake was 6.8, similar to the Kobe earthquake. Obviously, there was much less damage and loss of life (1 fatality) in Seattle than Kobe (>5000 fatalities). From part b, notice that (1) the equation does not work very well and (2) the *intensity* was much less than that experienced in Kobe. Make a LIST of as many reasons you can think of that might explain this difference.

2. (30) The U.S. seems to have moved toward tighter construction standards and structural retrofitting as the best way to mitigate earthquake hazards.

(a) Compared to earthquake prediction and fault manipulation, do you think this is wise? Explain.

(b) What are some of the disadvantages and problems with tighter construction standards and structural retrofitting?

(b) LIST and briefly describe on the back of this page some structural retrofitting techniques and changes in construction design that can be implemented to reduce seismic hazard.

3. (20) WEPP and RUSLE are two different ways to estimate the potential for soil erosion.

(a) What do the letters in these names stand for?

(b) One is *empirical* and the other *process-based*. What is the difference?

(c) Make a LIST of at least six different processes and conditions that at least in part control the rate of erosion.

4. (20) Gonzalez and Tornqvist (2006) suggest that a subsidence along the Louisiana Gulf Coast occurs because of a combination of *tectonism*, *glacio-isostasy*, and *compaction*.

Using written description and sketch(es), explain in detail what these mean and how they contribute to present day subsidence along the Louisiana coast.