Earthscope Seminar 2010 Discussion Notes
4/13/10

Nature of fault loading, earthquake cycles, and earthquake triggering

- Velasco et al., 2008
  - independent of tectonic environment?
    - local vs large tectonic regions
    - purpose of fig 4?
      - both trigger or not trigger at some stations, or stations in same region
        - pretty much everywhere detected and didn't detect at some point
        - look at in more detail to understand why trigger?
        - instead color by how many eq with triggering at each station?
      - fig 4 b looks like a network map since none were triggered by all events
        - more useful to compare to global seismicity?
  - some stations are on opposite side of world from the events and so maybe less likely to be affected
    - should consider something like strains from passing surface waves?
      - other studies have compared amplitudes/energy/stress/etc of earthquakes that have and haven't triggered earthquakes in certain locations and some found that the low frequency amplitude was most important
      - directivity
      - contour magnitude necessary to trigger at distances from a station?
  - triggered events vs natural events vs noise
    - don't look at specific events, hard to tell if specific events are triggered
    - test if statistically significant to say that some of them probably are triggered at some times and places
    - old stations have more spikes that aren't actually events? TA stations newer and have consistent setup so probably better
    - STA/LTA detections not necessarily events
      - various noise, problems with station, from processing etc
      - they deal with by ignoring stations with more than 100?
  - why only 15 earthquakes?
      - automated system -> should be able to do all that meet their requirements
      - ~250 earthquakes >= M 7.0, 1990-2007? (14 >= 8.0)
      - how did they pick the ones they did use?
      - look at every individual waveform to check on scale
  - on fig. 3: spike after love waves, then goes back down to previous level, then gradual increase
    - delayed triggered earthquakes?
    - L1, L2?
    - aftershocks?
  - should look at periods of time when no large earthquakes to see if stations have a lot of spikes
- Gomberg et al, 2004 – events triggered by Denali fault earthquake in western US and British

Columbia
    - analysts look for events
- Rubistein et al., 2007 – tremor triggered by 2002 Denali fault earthquake under Vancouver Island
    - tremor vs earthquakes
        - clear separation or just matter of definition?
    - tremor always during same phase of love waves?
    - surface waves compared to not filtered -> good
    - anywhere else with triggered tremor along west coast of US (WA, OR, northern CA, San Andreas fault), or just there because of the geometry?
        - stress orientation seemed to be important for this example -> need that for other examples?
        - further south the orientation of the slab is different
        - look at larger data set with more triggering sources to test how alignments affects how much triggering of tremor happen
            - huge eq from opposite side of Pacific
            - sources from San Andreas
            - look for tremor halfway in between Vancouver and San Andreas possibly triggered by sources in both areas
    - model specific to subduction zone with high volumes of fluid
        - where else maybe? San Andreas, Japan, South America, India
- Linde & Sacks, 1998
    - most statistically convincing of the papers?
    - don't know for sure always which happened first (earthquake or eruption) because the time of the eruption is often not precisely (they discarded any when day is not known, but assumed earthquake first if in same day and don't know otherwise)
    - what is called an eruption?
    - could they both be triggered by something else?