Technical #1 Discussion

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Discussion

- Should scenario consist of what could happen or what is most likely? What would impact Tijuana?
  - Rose Canyon + Descansa fault
    - Rupture into San Diego Bay?
    - Which will hit Tijuana harder?
  - UCERF3: Stepover widths <5km (allowing rupture all the way through)
  - Other faults? San Miguel? Vallecitos?
  - Why choose Rose Canyon Fault?
    - Bisects city of San Diego
    - Most damage to San Diego/Tijuana
    - More likely earthquake than Vallecitos fault
    - Active fault that is not creeping (when moves, it will be big)
    - 16km depth based on EQ's in SD. During large EQs will punch deeper

Discussion

- Dual Fault rupture vs. single fault rupture?
  - Rupture through two faults?
  - Or maybe EQ on Descansa will trigger another fault/sequence (days/weeks/months)
- Predicted return period on 6.9 EQ? 1000 years
  - Mode switching between periodic and cluster behavior
- Large EQ on Rose Canyon will change the stress state on other faults (could unstress)
- Tsunami hazard to San Diego?
  - Would trigger landslide
  - LJ Submarine landslide
  - There is a potential for tsunami (not Sumatra like) but 1-2m could still be deadly
  - Landslide tsunami's offshore dissipate quickly but can be very disruptive.

Discussion

- La Nacion Fault
  - Secondary fault to Rose Canyon system
  - Normal fault- extension to San Diego bay
  - Will it have EQs on its own or move with Rose Canyon?
  - Could produce M6 every 10,000 years
- Spanish fault possibly mapped incorrectly?
- What is an interesting earthquake (difference between inconvenient and disastrous)
  - Disruption to facilities and infrastructure (don't need a M8 to give us a problem).
  - At what point does it become an issue?
  - Below M5 (they are nuisances, but no surface rupture)

Discussion

- What about a M6?

- M6.9 seems like reasonable magnitude

- Recurrence interval (if it is too large, why do we care now?)
    - Something that will affect our community in our lifetimes
    - EQs don't always follow the timeline.
    - Lessons learned in the exercise are transferable

- Do we have instrumentation monitoring movement of the fault?
    - Seismometers, seismographs, GPS motion
    - No near field instruments like creep meters (no evidence that it is creeping)

- What is the fine line between what is likely vs. beyond?
    - How do we compare risk and hazard?
    - Max magnitude 7.5 or higher vs. likely magnitude of 6.9
    - Societal question? What risk do we want to prepare for?
    - Quantify it in terms of engineering parameters (acceleration, period, frequency) and vulnerability (soil conditions)

Discussion

- How can we use estimates of magnitude and relate them to engineering terms?
    - Can get seismo-engineering aspect (response spectra) (can be modeled)
    - Forward vs. backward directivity
    - Be clear about choice of scenario earthquake and why it is being made (from an engineering perspective)
    - If we look at a M6.4 that lasted 10 sec: how did it affect different types of structures. Make it more physical or visual to people (how bad does the earthquake have to be before your own house or old town falls down)

- Seattle scenario:
    - Shake maps produced that helped engineers figure out what it meant (derated event to get better map to study) Red is >0.4g
    - What would shake map for San Diego look like?

- Do you recommend a series of scenarios? Would multiple options add value or muddle up things?
    - Options for decision makers (do you want to pay for worse case scenario or something more likely?)
    - Most scenarios looked at single event. Doing a suite of events gives meaningful answers but message may get confused.

Discussion

- Directionality
    - How do you capture this in Hazus? Does it translate into certain ground motions for input in Hazus?
    - Directivity modeling is in the source, not in Hazus, which takes intensity from earthquake.
- What is the likely duration of the event?
    - Shear wave velocity 3s (strong shaking of 10-15 sec)
    - 16km rupture depth up towards surface and down the fault
- Hazard level? Probability?
    - 1000 year event (but incomplete record)
    - From building professional standpoint, work with credible earthquakes
- Keep it simple: will result in a more impactful message
    - We should envelope different options but for document might be better to choose one to build story about
    - One ground motion run, multiple Hazus runs
- What could be other geologic hazards to San Diego region?
    - Secondary (shaking related ground failure): liquefaction, EQ induced landslides
    - Resources available at CGS to work on geologic mapping
    - Assess liquefaction potential to lagoon areas (important infrastructure across these areas)

Discussion

- Any plans to update maps in SD?
  - No plans now, but we need to update them. Last one in 2008
- Design scenario EQ:
  - Managers of major companies and infrastructure look at financial impact (financial return period, financial life time of 50 years).
  - May design for physical lifetime of 50 years but stays in service for 75-100.
  - Owners/managers may not want to buy into a 1000 year event.
  - May want to consider reducing it by a bit to get financial stakeholders to buy into it
- Piece missing from regulatory side: hazards that affect roadways or sewer systems?
  - Have different drivers (economic and regulatory) that will affect infrastructure differently
  - We still have old buildings, effects of a major EQ will be significant
  - Suggest a 6.8 or 6.9 is fairly likely to occur
  - Rose Canyon long enough into its recurrence cycle, it can produce a 6.7 tomorrow

Discussion

- Planning scenario is with Tijuana… whatever number we pick, it may cause more significant damage to Tijuana

- Use most likely large event, plan for the worse case. If we get something smaller then we are prepared for it. Maybe assume ruptures in both directions.

- Steps to move forward?
  - Starting point of model earthquake?
  - Once chosen EQ, develop ground motions, surface rupture model and effects on structures, that leads to social impacts
    - Return period, directionality, directivity
    - Need a working group