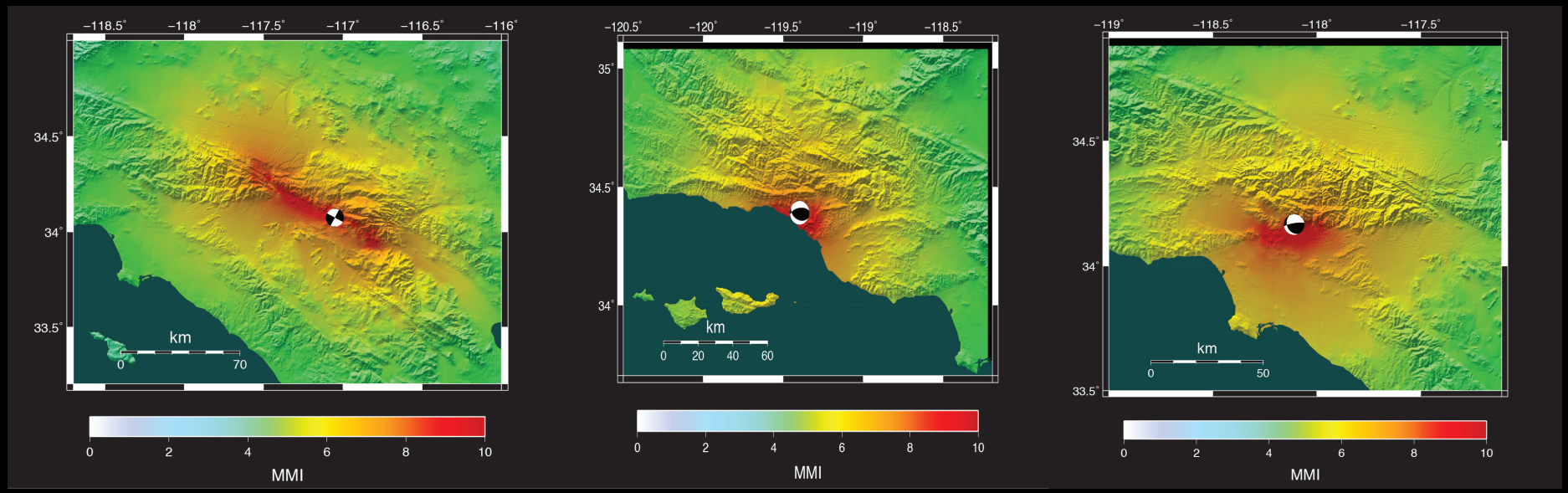
SCEC Annual Meeting
SCEC UseIT Interns'
'Northridge Near You' Scenarios

How can SCEC interns' products influence our scientific creative process at this year's SCEC Annual Meeting?

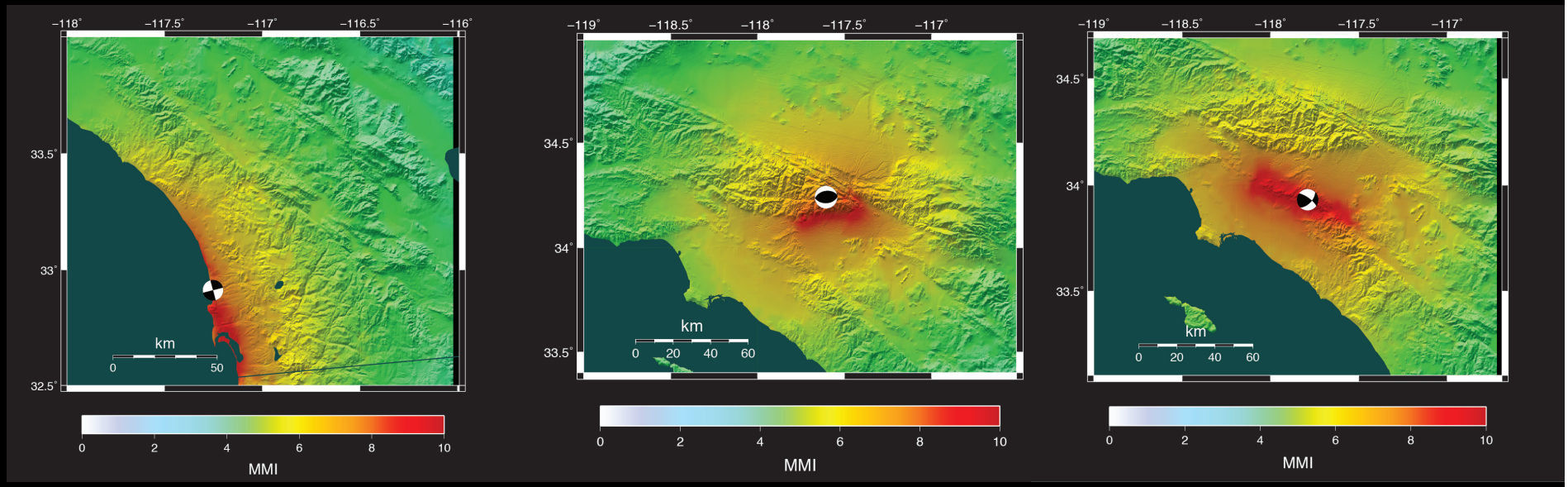
Make use of scenarios as a series of thought exercises, building on the 'Northridge Near You' theme, and considering ways to ensure that thoughtful & necessary observations will be made after future earthquakes in southern California

SCEC earthquake science exercise

- **Thought-provoking scenario exercise uses**
  - **How would the scientific community respond?**
  - **In what ways can advanced (and rapid) planning result in improved scientific data acquisition?**
  - **What key observations are needed to answer remaining big questions in earthquake science?**
  - **For each scenario, think it over and interact with the interns and your colleagues in lobby**



2013 SCEC Annual Meeting - Scientific Response Scenario Activity



What scientific questions can be answered?

- Which fault strands are active?
  - E.g., for SAF, do the Mill Creek and other strands rupture along with the San Bernardino strand?
  - Are the Crafton Hills, Cucamonga, SJF fault zone activated?
- Place permanent GPS stations around adjacent faults to gauge how slip transfers to these structures.
  - Permitting?
  - Ongoing O&M funding?
- What is the fault structure at depth?
- How deep did co-seismic rupture penetrate (i.e. beneath brittle/ductile transition)?
- Real time EQ rates from CSEP models?

What data should be acquired?

- CMT/focal mechanism/finite-fault needs to be distributed as soon as possible
- Aerial reconnaissance with DSLR/GPS air photos
- Dense high rate GPS with co-located strong motion instruments
- Surface rupture mapping and detailed documentation of offsets
- Post EQ Lidar for comparison with B4 (rapid, within 7 days)
- UAVSAR (NASA/JPL) as soon as possible and repeatedly afterwards with rapid processing

What observational systems should be developed?
How can the current systems be improved?

- Satellite InSAR and UAVSAR
- Enhance range/resolution of hi-res topographic observations
- New seismic observation systems: MEMS, NetQuakes, Smart devices, OBS
- Instrument deployment in regions of increased Coulomb stress

What methods do you use for sharing data?

- response.scec.edu
- CA EQ Clearinghouse
- UNAVCO for GPS/RINEX
- SCECDC, data center
- #SCEC<EQNAME>
  - Can we take advantage of social media feeds?
- Cross-sharing of data/information?
  - Should there be a hierarchy of data input streams?
  - SCEC data “form”

What additional **rapid** products are needed?

- Tilt maps
- Strain map
- Damage proxy map
- High resolution ShakeMaps
- Aftershock probabilities (space and time)
- Coulomb stress change modeling

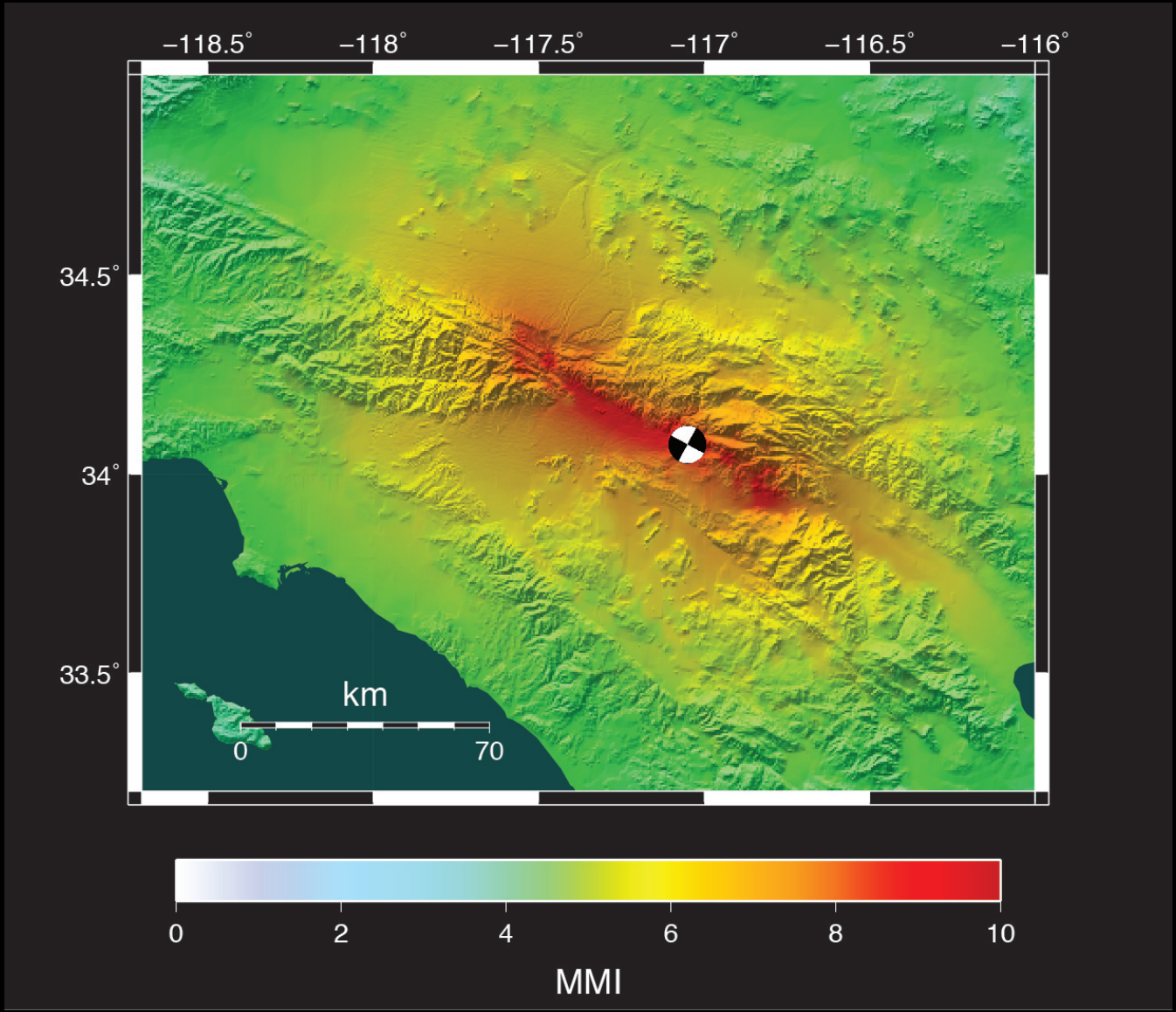
Classic Post-Eq Science

- **How can immediate post-earthquake data acquisition influence our science?**
  - **Obtain synoptic overview of main rupture, and significant secondary effects**
  - **Capture evanescent data such as surface faulting, landslide, liquefaction, etc.**
  - **Observe aftershock patterns and characterize statistics of their occurrence**
  - **Capture deformation transients (retrieve high-rate continuous data, augment continuous GPS station coverage with survey-mode GPS, establish new continuous GPS stations)**

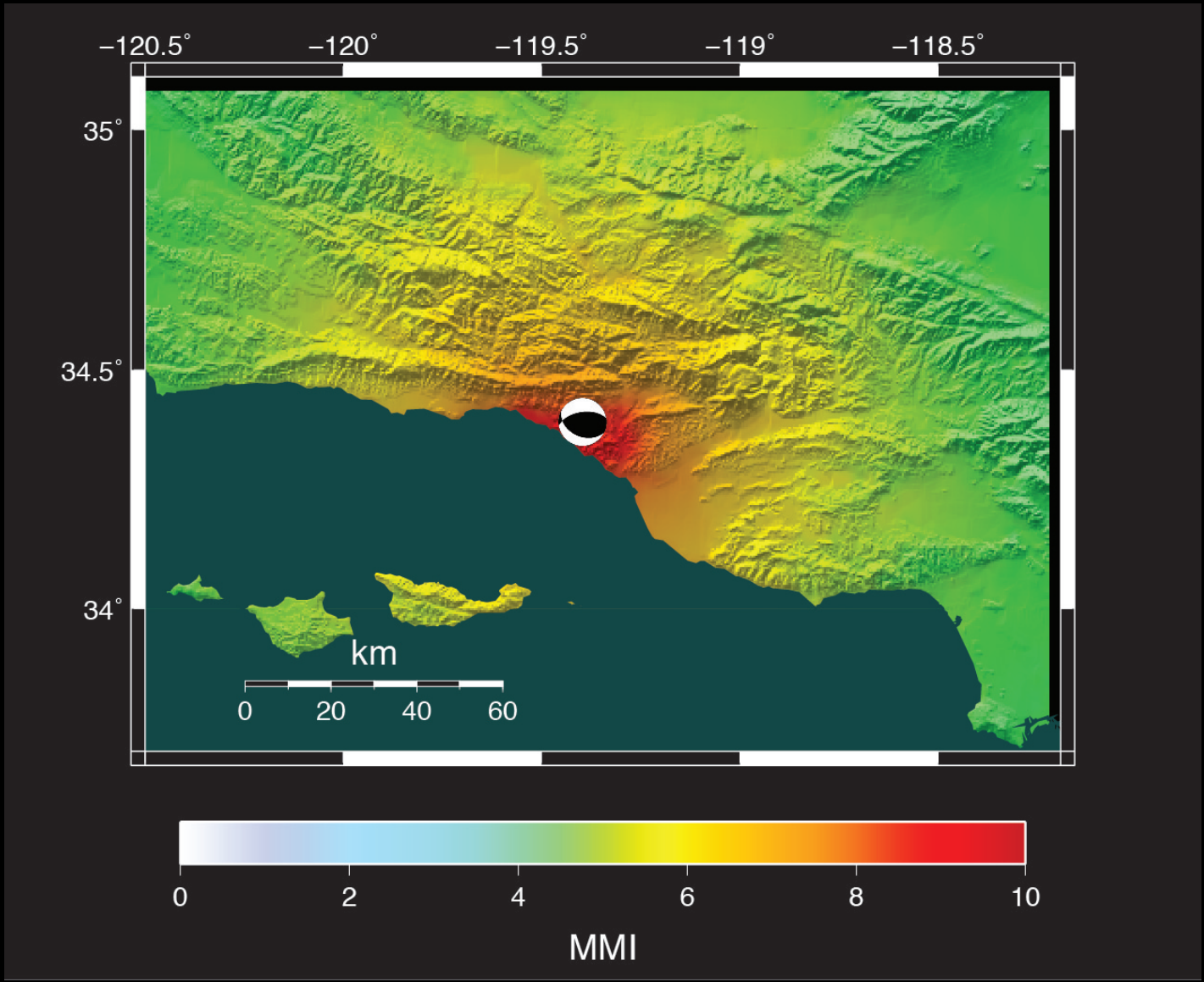
Novel Post-Eq Science

- **In what *new ways* can immediate post-earthquake data acquisition *revolutionize* our science? What can we only know from a well-designed post-earthquake experiment?**
  - **Heat from fault by drilling, frictional properties? (as was recently done for Tohoku, resulting from pre-earthquake scientific workshop & coordination)**
  - **Correlate fault geometry or damage zones with radiated energy? (deploy array?)**
  - **Predict aspects of aftershock sequence statistics or migration with respect to co-seismic fault; will a second large event happen off the end of the first rupture?**
  - **Predict secondary fault ruptures, e. g. Coulomb stress changes on nearby faults**
  - **Employ new technologies (e.g., new seismic array configurations, or repeat-pass airborne image differencing methods) to help examine slip variation along-strike and other aspects of the rupture process**

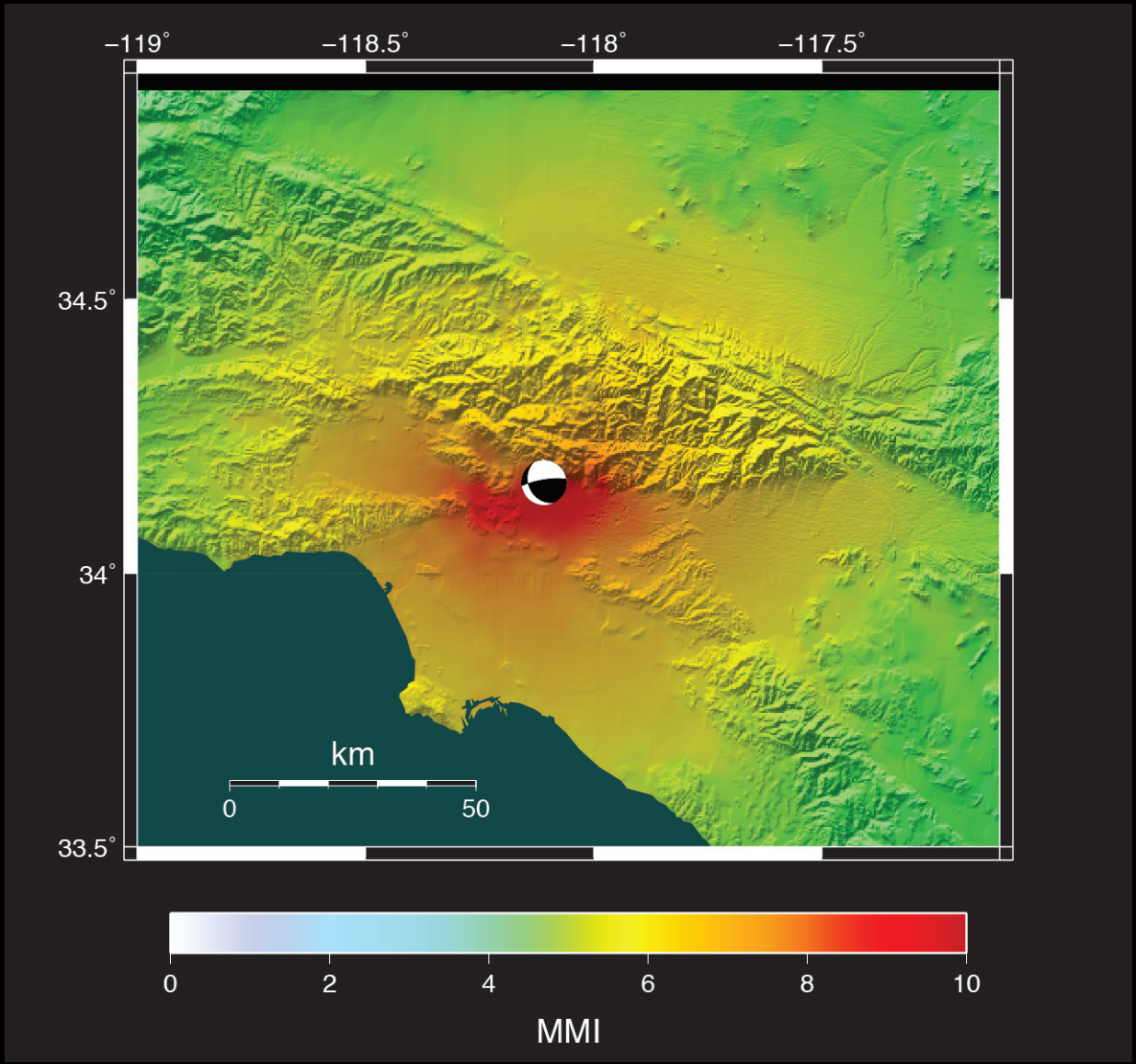
1) San Bernardino – San Andreas; M 6.85, right-lateral strike slip (local thrusting)
34.116, -117.112, depth = 7 km



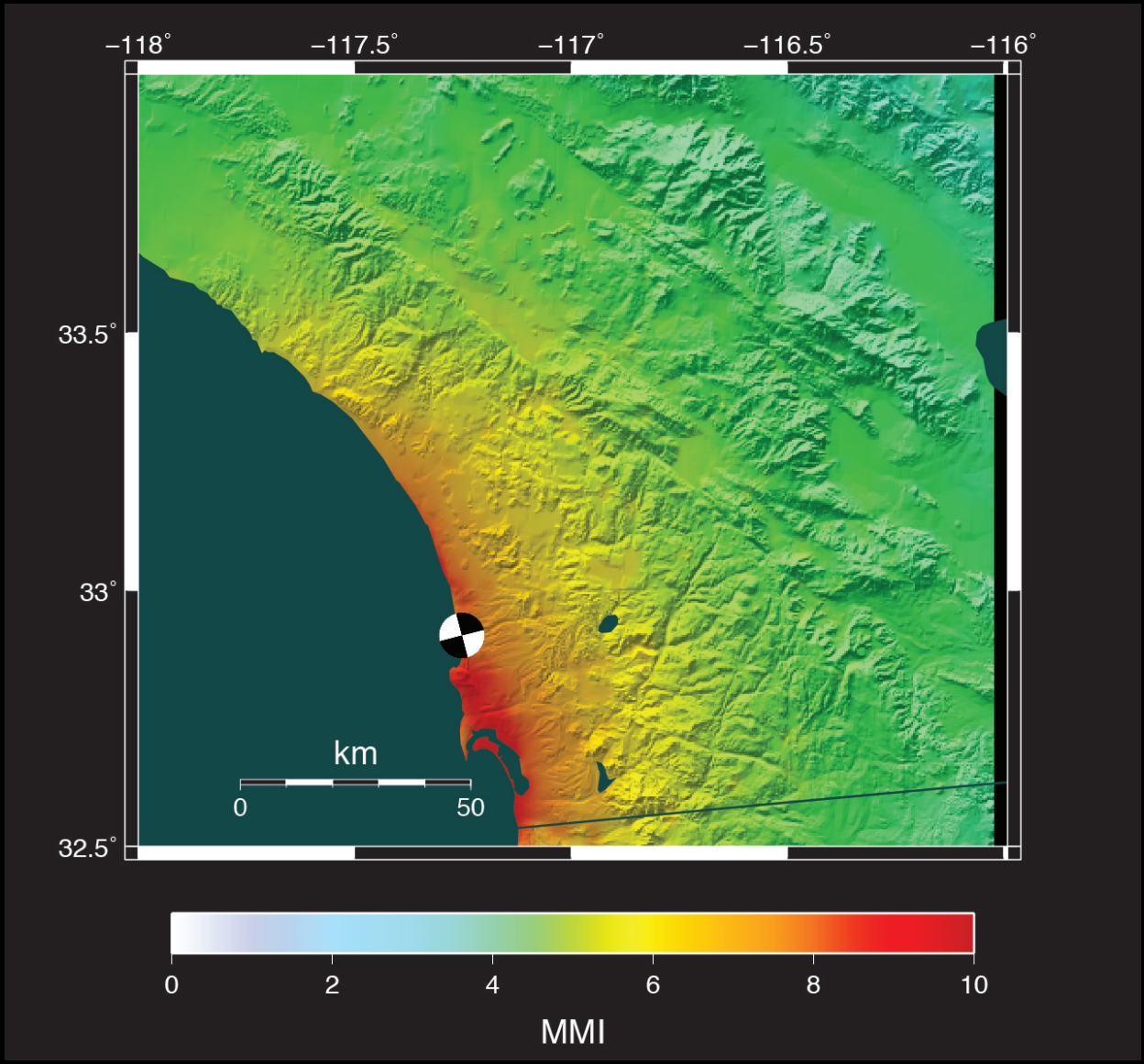
2) Santa Barbara - Red Mountain (Ventura); M 6.55, thrust
34.401, -119.235, depth = 12 km



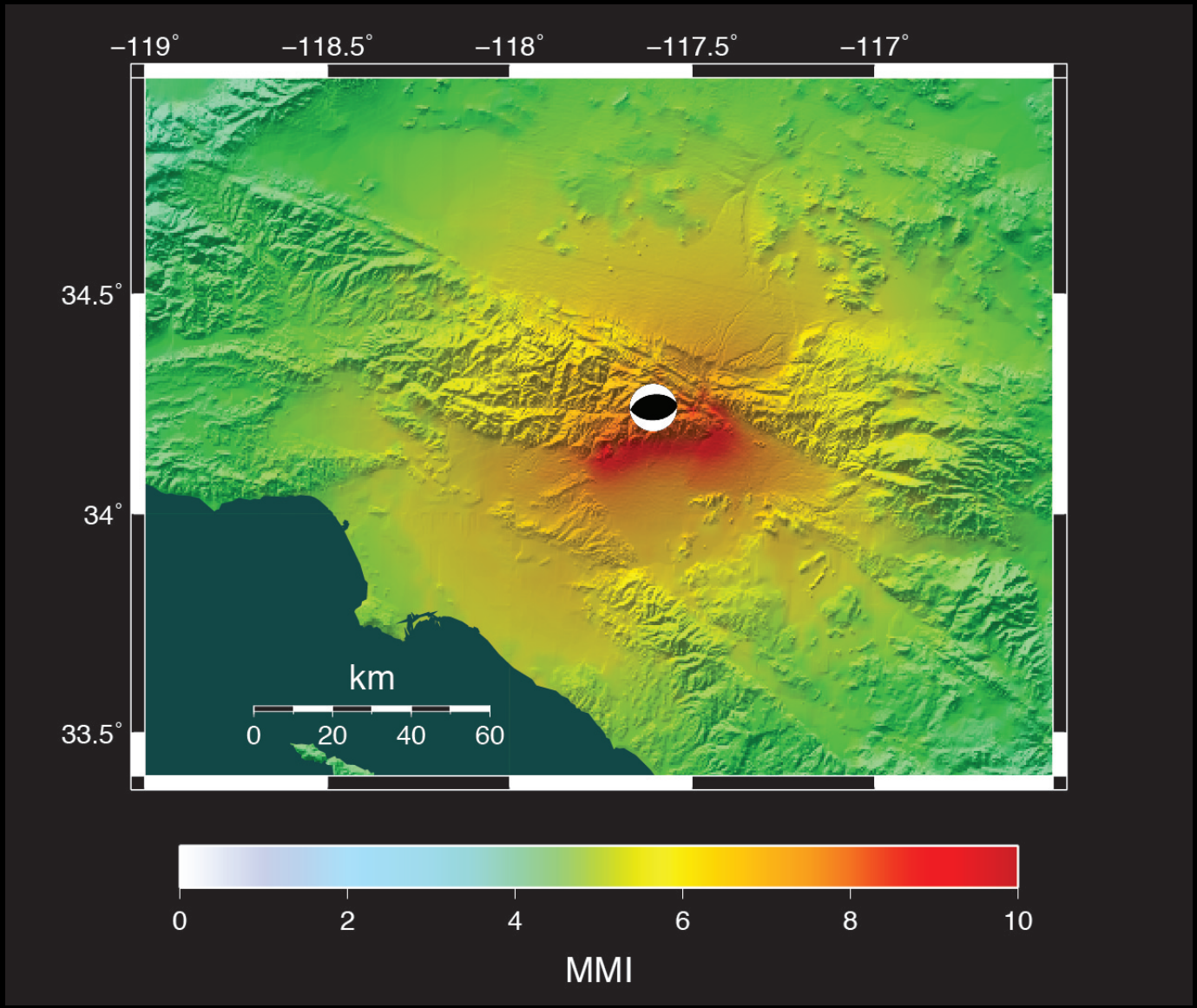
3) Pasadena - Raymond (Downtown LA); M 6.65, oblique, thrust & left-lateral
34.179, -118.137, depth = 9 km



4) Mission Valley – Rose Canyon (San Diego); M 6.75, right-lateral strike slip
32.898, -117.259, depth = 6 km



5) Ontario – Cucamonga (Rialto); M 6.55, thrust
34.240, -117.517, depth = 7 km



6) Santa Ana – Elsinore (Whittier); M 6.85, oblique, thrust & right-lateral
33.944, -117.811, depth = 7 km