



CAS Spring Meeting: May 25, 2010

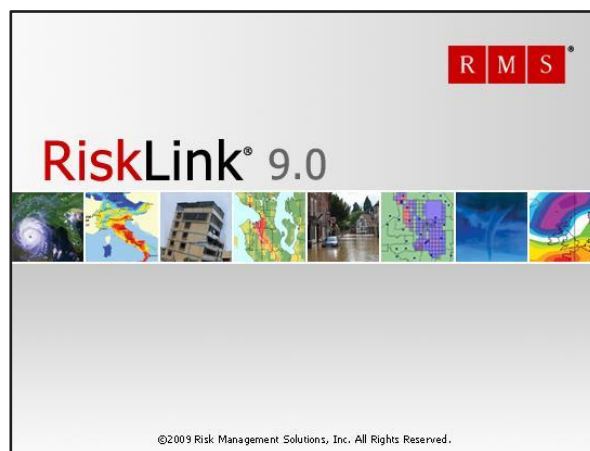
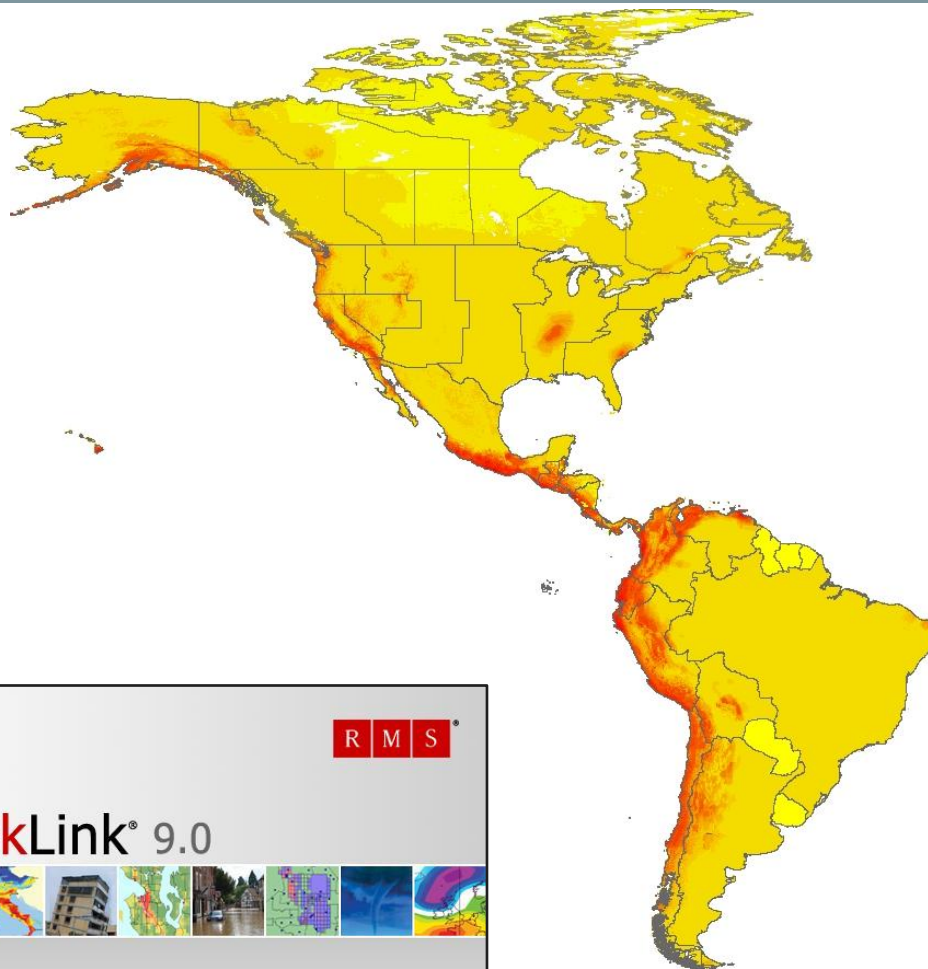
A New View of Risk: 2008 USGS Hazard Updates and RMS Earthquake Modeling

Don Windeler

Director, Nat Cat & Portfolio Solutions

Version 9.0 Earthquake Modeling


- Released August 3, 2009
- Seamless, consistent coverage in version 9.0 for all earthquake-exposed countries in the Americas
 - US hazard model developed from USGS 2008 NSHMP
- ALM, DLM, & Industrial Facilities models for the entire region
- Major update to US EQ Casualty & Workers' Compensation as well as Property



A Comprehensive Update for US & Canada EQ




Generate Stochastic Events



Assess Earthquake Motion



Apply Exposure



Calculate Damage



Quantify Financial Loss

USGS 2008 NSHMP

New and revised source models and rates

“Next Generation Attenuation” (NGA) ground motion modeling

Enhanced resolution inventory for treatment of “unknown” data

State-of-the-art structural response modeling tools

Review of Post-event loss amplification

Incorporate new time-dependent & other probability models

Local site response studies, basin modeling & new geologic maps

Review and updates to IEDs and ILCs

Expanded set of structural models (age, height, material, configuration...)

Ongoing Super Cat research

IFM, EQSL, Builders’ Risk

Uncertainty

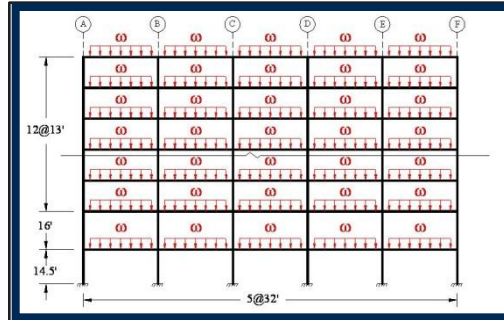
Vulnerability Challenge: Improving Confidence Despite Lack of Recent Events



**Detailed reanalysis of
RMS Northridge
database:
63,000 claims &
\$3 billion in losses**

**Extensive Kobe
damage state data on
modern urban
building stock**

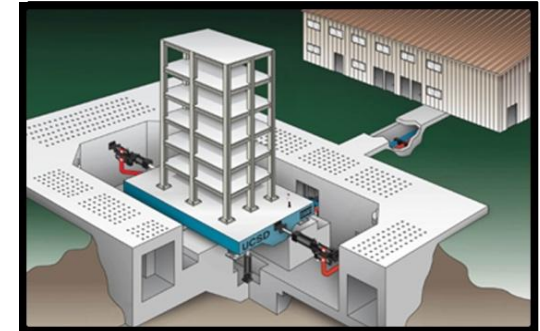
Historical Loss Data



**More than 12,000
individual simulations
using state-of-the-art
structural analysis tools**

**Extensive design and
assessment of
representative building
models for existing
building stock**

**Numerical Simulation of
Building Performance**

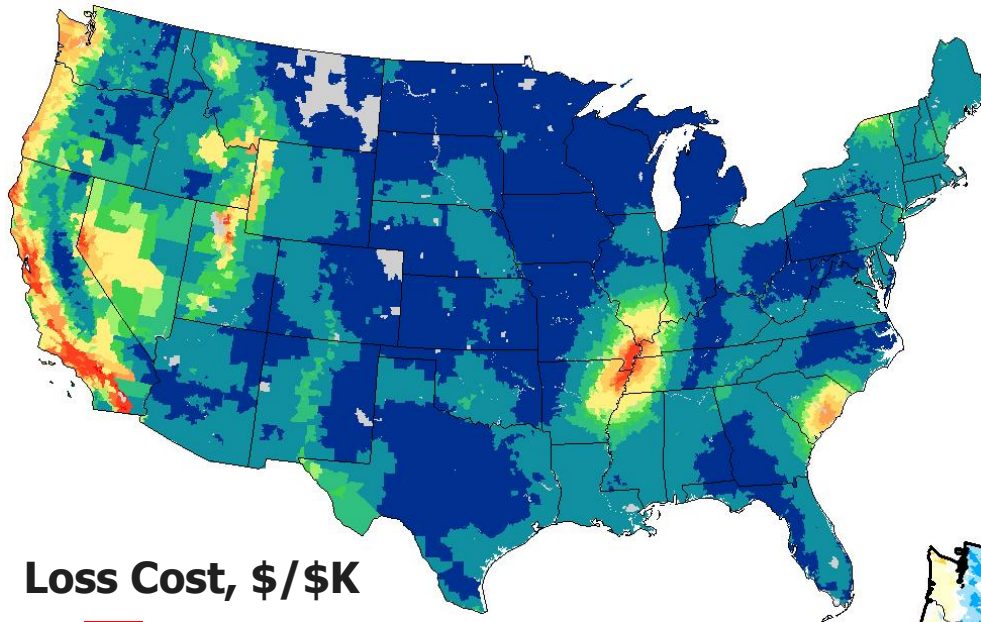


**Rapidly expanding
knowledge base from
full scale destructive
testing in international
research centers**

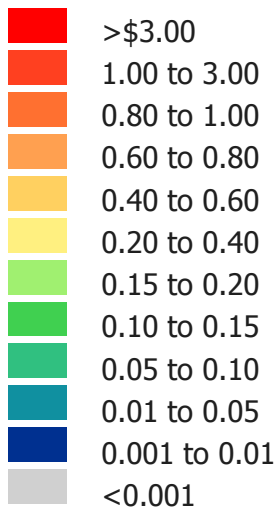
- **Structural**
- **Non-structural**

**Empirical Laboratory
Test Data**

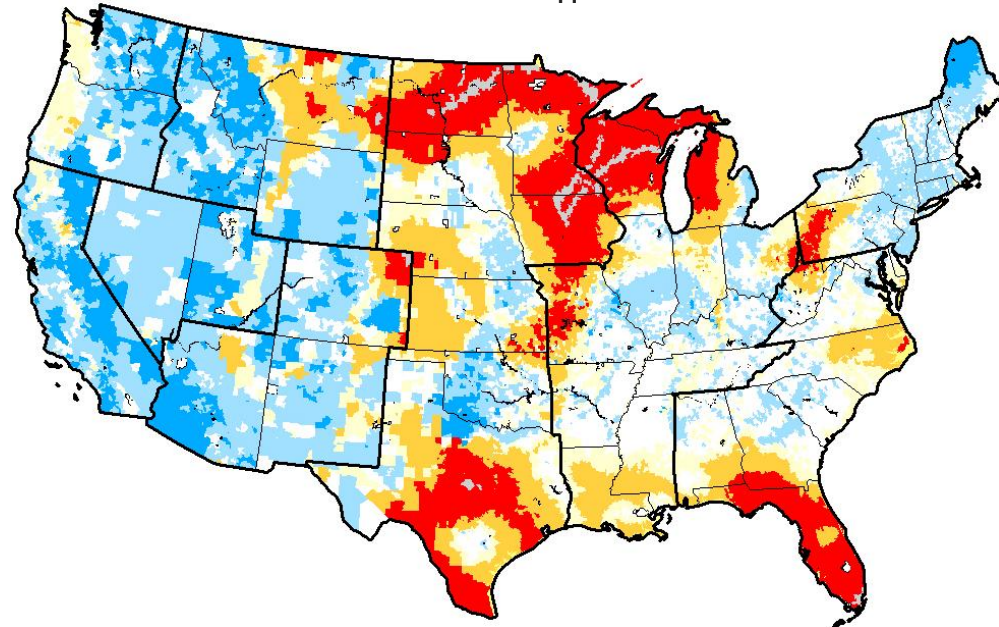
Commercial AAL Change by ZIP Code



Loss Cost, \$/\$K



Ratio, v9.0/v8.0

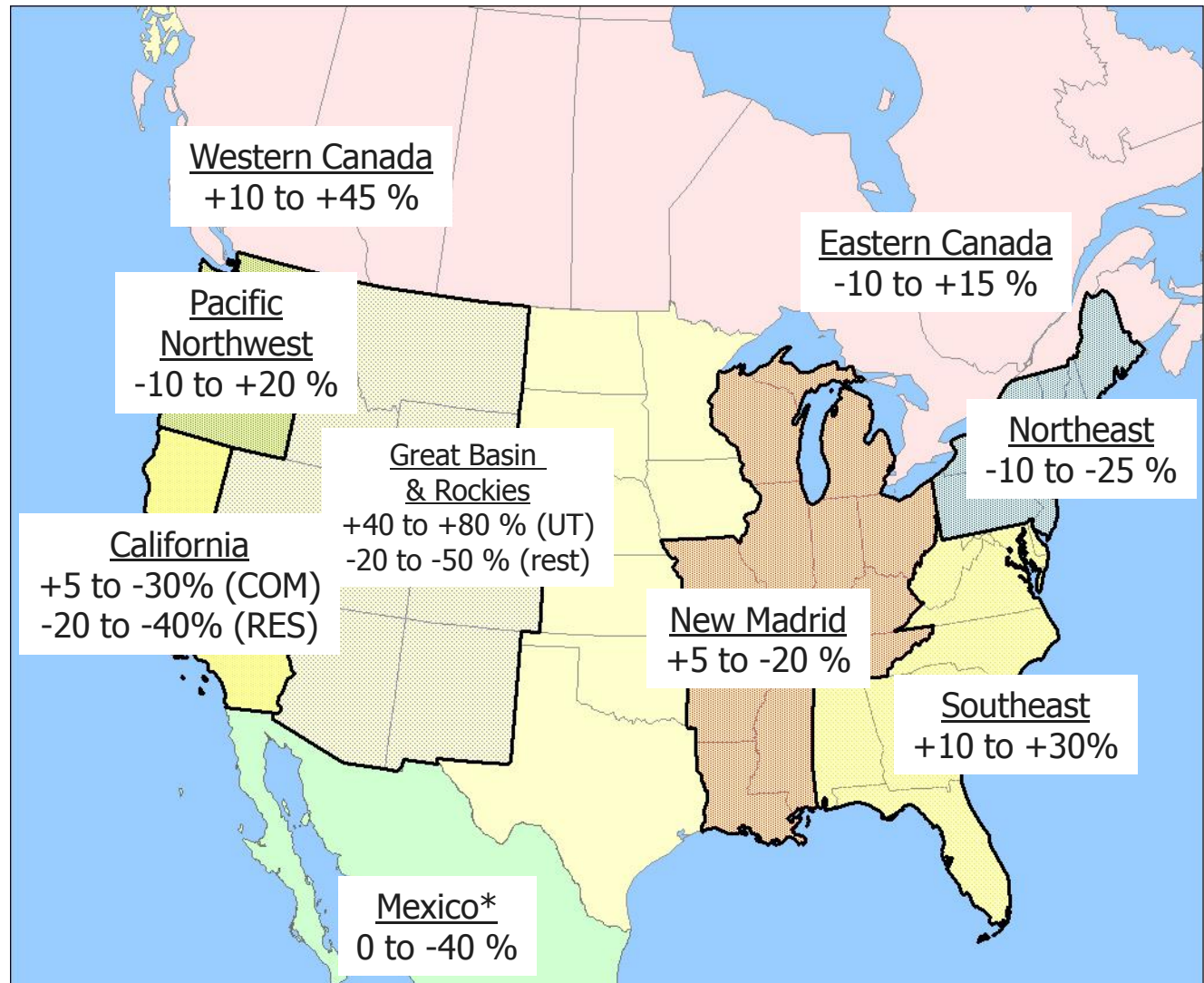


Changes In Regional Property EP Results

- Western US changes dominated by ground motion attenuation (NGA and subduction)
- Drivers in the eastern US more variable: Rates in Northeast; attenuation, rates and vulnerability in New Madrid

All U.S.
-5 to -30 %

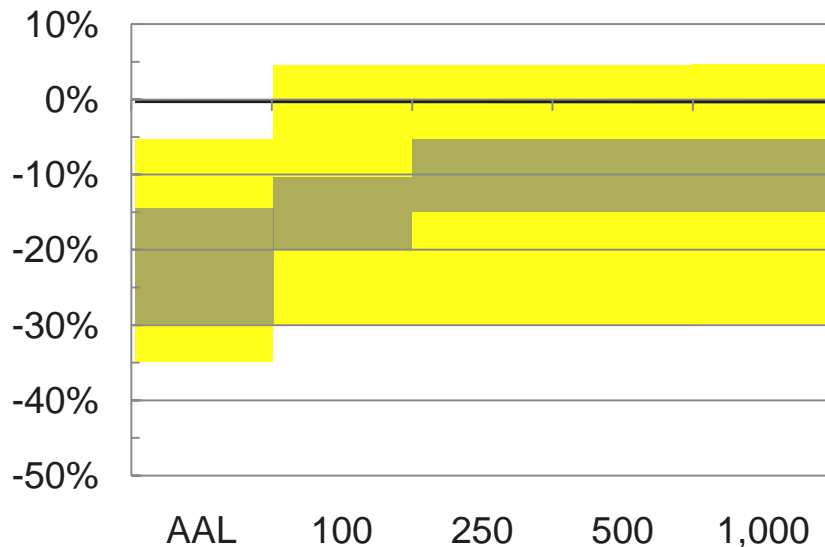
Assumes constant exposure



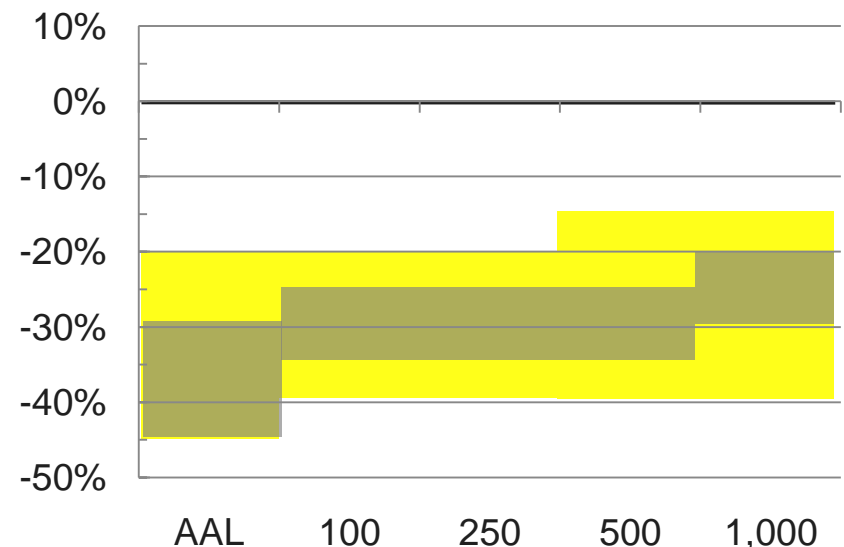
Portfolio Changes for California in v9.0

- This guidance reflects results for numerous RMS client portfolios
- RMS guidance on expected changes gradually became less conservative as more portfolios were incorporated into the analysis
- Key risk metrics will reduce by 5 to 15% for most commercial portfolios and 25 to 35% for most residential portfolios

Commercial Gross Loss Changes

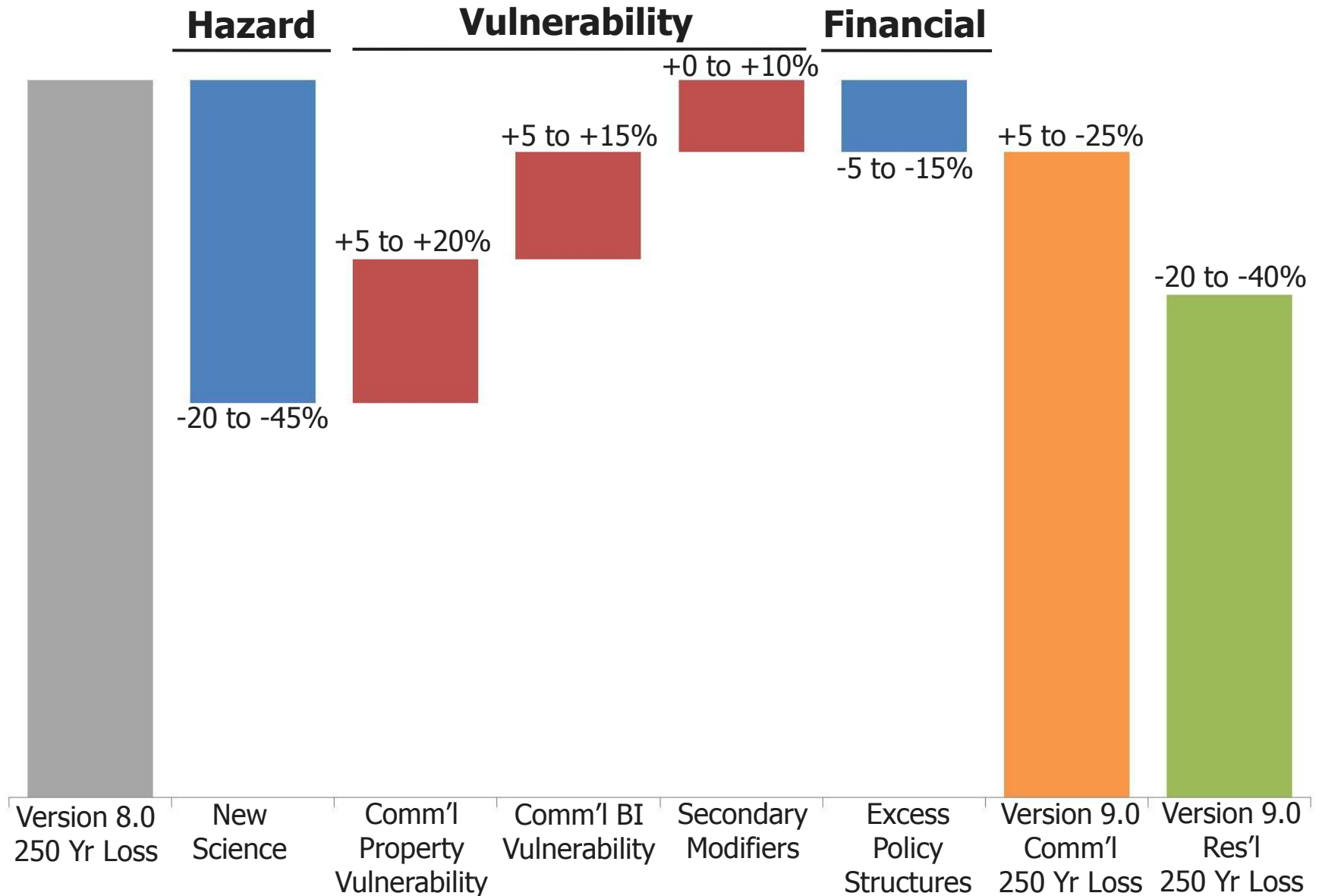


Residential Gross Loss Changes

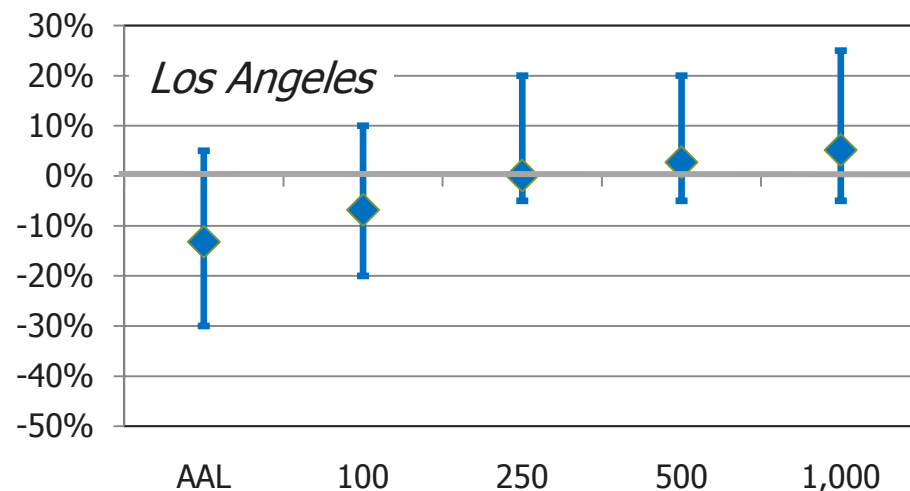
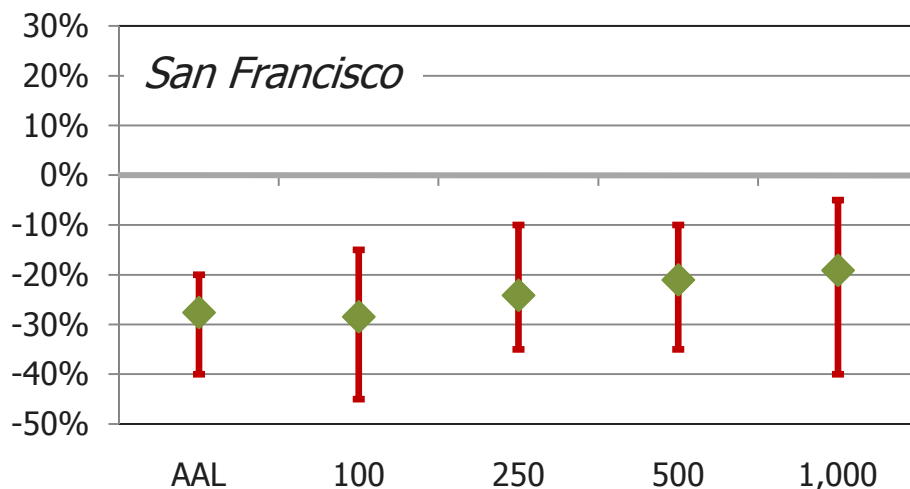


Envelope of Observed Changes = Most Portfolios =

Principal Drivers of California Changes in v9.0



Variations in Shape of EP Changes Within California



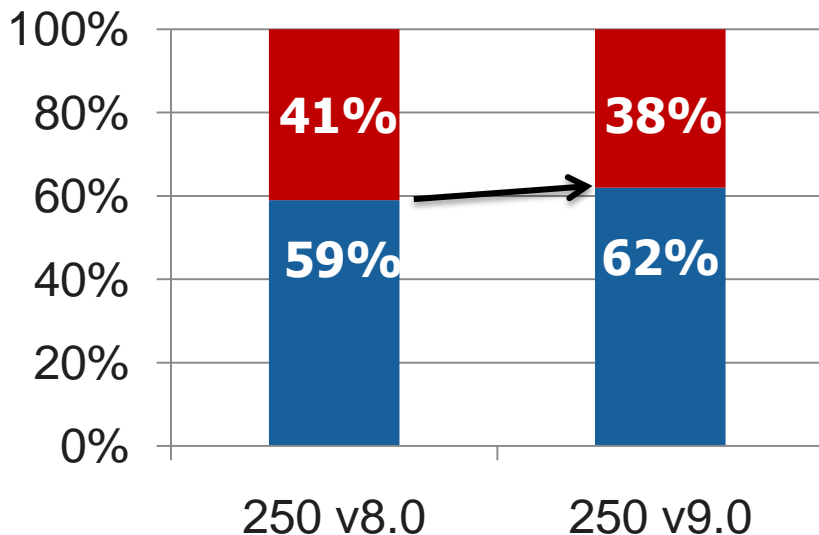
Changes for Commercial Portfolios

- Changes in results for most portfolios are relatively uniform across the EP curve for most areas outside of Los Angeles
- Changes in Los Angeles consistently are greater at short return periods and for AAL as a result of rate reductions for low/moderate magnitude events, in particular on the Santa Monica fault system

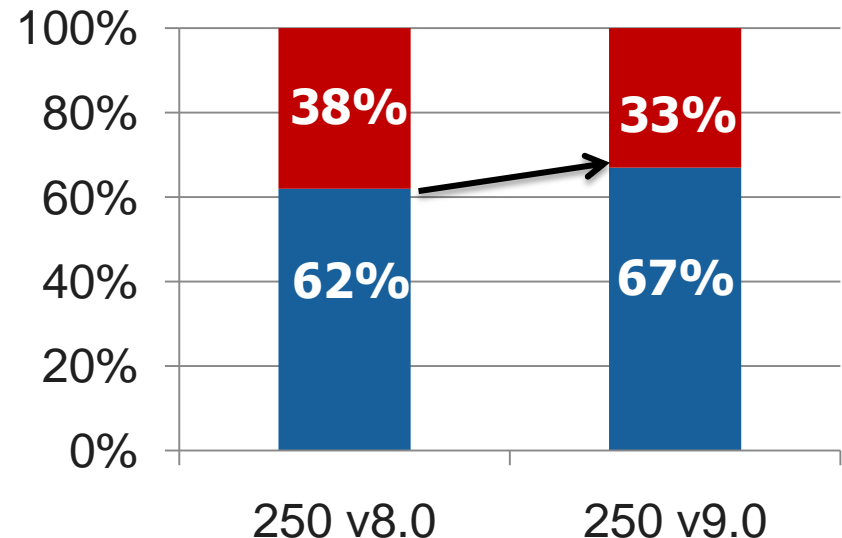
Changes in Regional Drivers of Risk

- In the new model, Southern California drives even more of the risk for most portfolios than it did previously
- As a result, portfolio modeled losses will be most sensitive to any changes in exposure in Southern California

Commercial



Residential

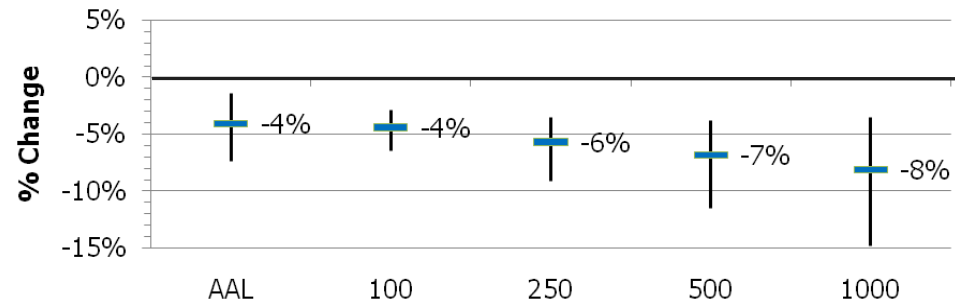


■ Northern California
■ Southern California

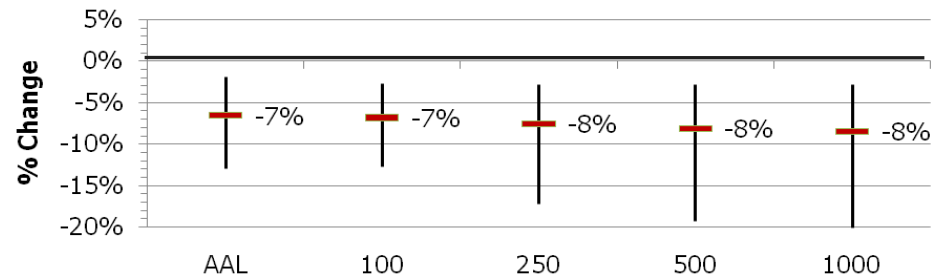
Model Sensitivity – Uncertainty in Attenuation (NGA)

- Average range of impact on client loss metrics at key return periods:
 - decrease of 4 – 8% to increase of 11 – 15%
- Varies as a function of
 - Geography
 - Strike-slip vs. thrust
 - Event magnitudes
 - Portfolio composition (especially height!)

% Change in Industry Loss Estimates With Boore & Atkinson / v9.0



% Change in Industry Loss Estimates With Campell & Bozorgnia / v9.0



% Change in Industry Loss Estimates With Chiou & Youngs / v9.0

