# Catastrophe Modeling Twenty Years After Northridge

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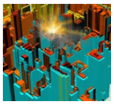
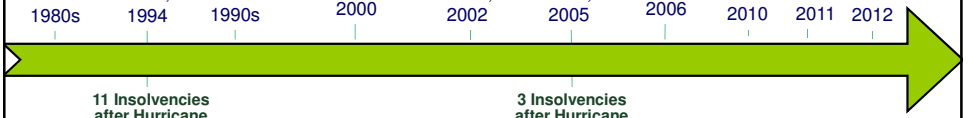
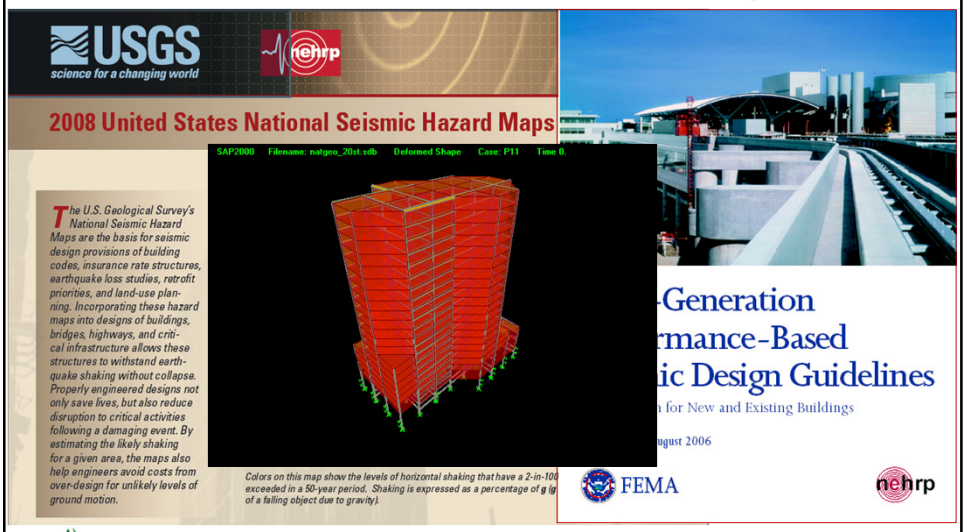
## A Brief History of Catastrophe Modeling



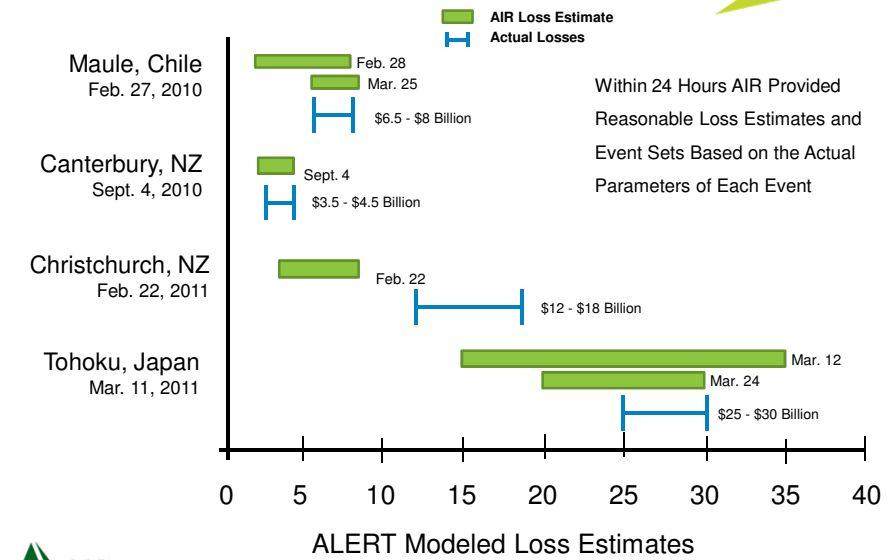


## Large Body of Research Since Northridge Has Improved Catastrophe Models



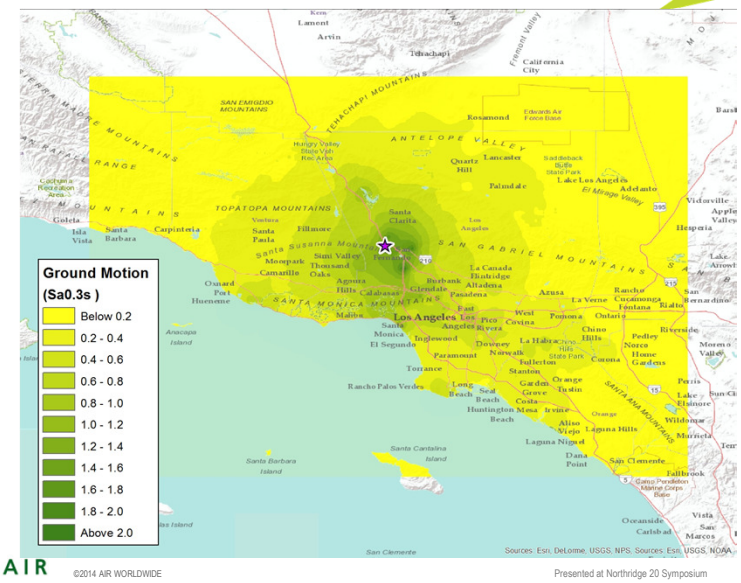



## Current Generation of Catastrophe Models Have Skill in Estimating Losses




Within 24 Hours AIR Provided Reasonable Loss Estimates and Event Sets Based on the Actual Parameters of Each Event

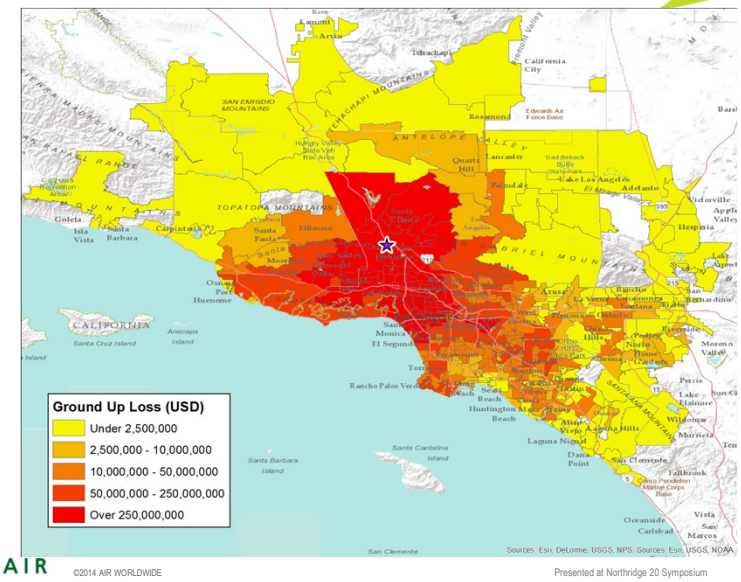
## Observed Ground Motion from Northridge Shows Pockets of High Shaking





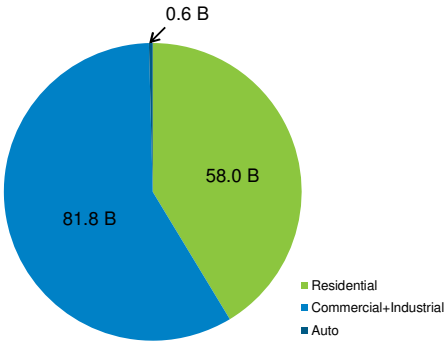



## Modeled Loss Footprint for Repeat of Northridge (2012 Property Exposures)



## Direct Impacts of Northridge

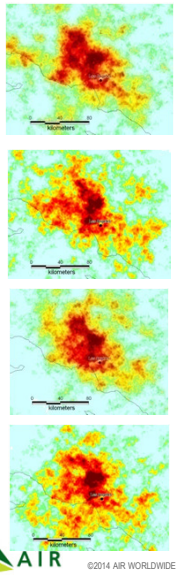
- Predominant impact is due to shaking and damage to buildings and contents
- Secondary perils, like fire following, liquefaction make minor contributions
- Significant contribution of losses due to business interruption

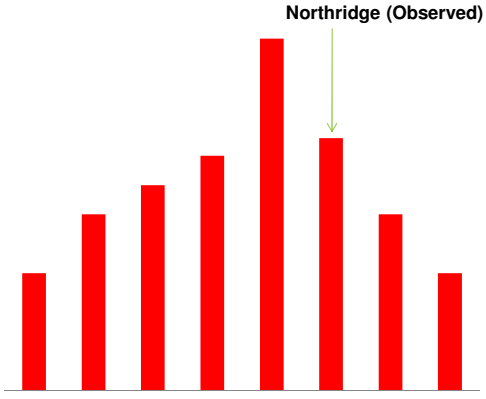






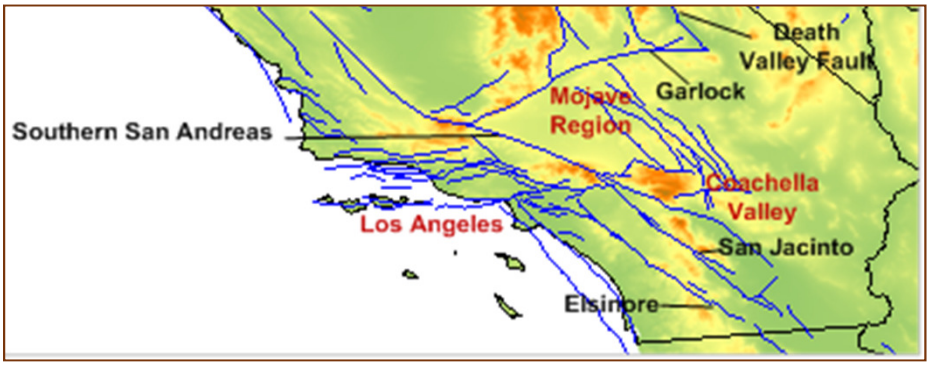
## The Next Northridge Will Result in a Different Loss Outcome






**Distribution of Modeled Losses For Future Northridge Like Scenarios**

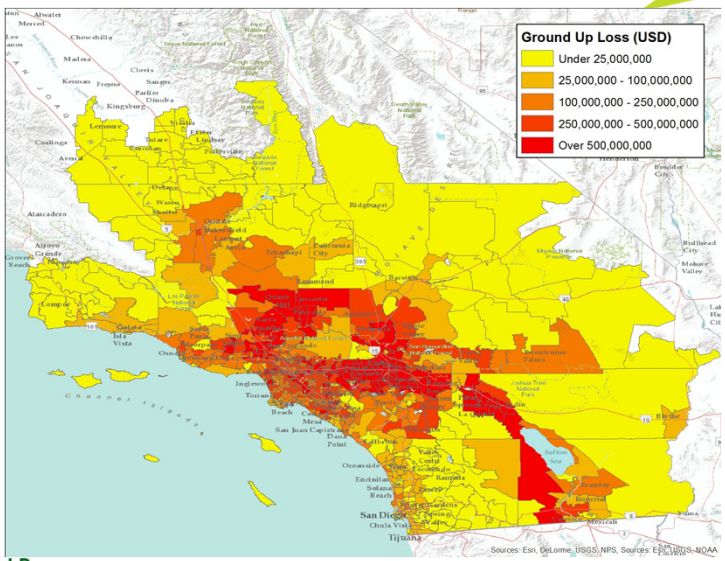
## Many Faults Contribute to Risk in Southern California





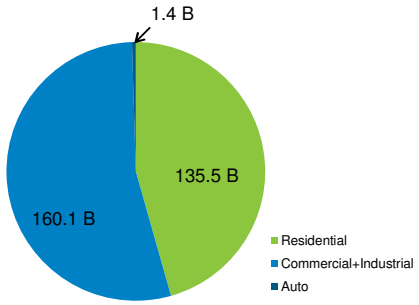


## Modeled Loss Footprint for Analog of Shakeout Scenario on San Andreas (2012 Property Exposures)



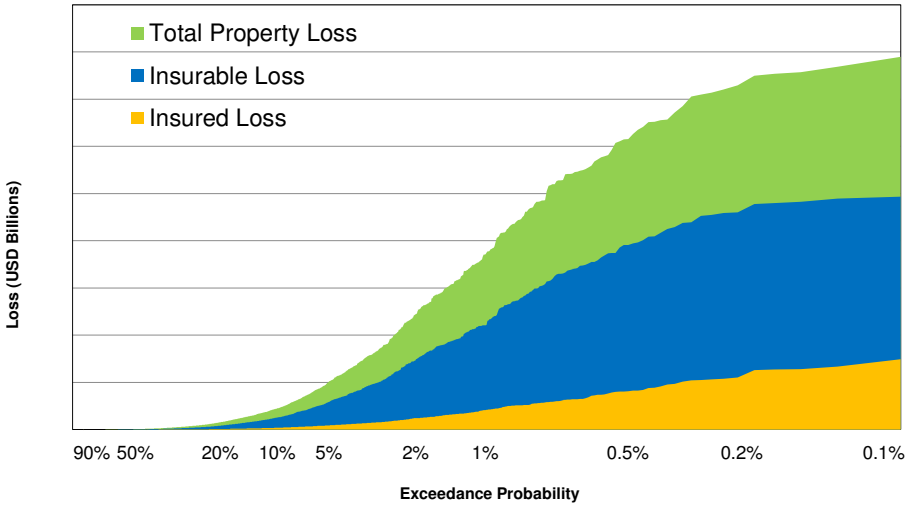
## Direct Impacts of Scenario on San Andreas

- Predominant impact is due to shaking and damage to buildings and contents
- Fire following makes a significant contribution
- Significant contribution of losses from business interruption
- Economic impact to be felt in many sectors for a long time





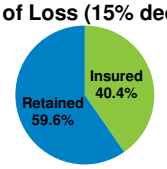

## Under Today's Market Conditions, Only a Small Fraction of the Total Residential Losses Is Insured



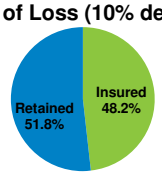
## Models Can Be Used to Estimate Share of Retained and Insured Losses Under Alternative Schemes (Simulation of Northridge)

**Single Family Homes**

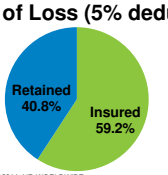
% Share of Loss (15% deductible)




% Share of Loss (10% deductible)

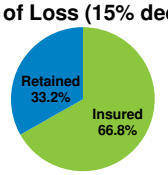



% Share of Loss (5% deductible)




**Commercial**

% Share of Loss (15% deductible)

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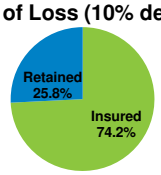


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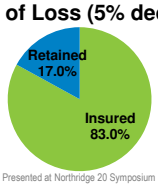





## Summary

- Catastrophe modeling has improved over the last two decades and provides a credible view of risk
- Earthquake risk in California has been quantified, however, there are gaps in dealing with the economic consequences
- Models can be used to design various insurance products and develop strategies for risk mitigation and risk management
- Today a large part of the risk in California remains uninsured and models can be leveraged to evaluate alternative scenarios to create a viable but stable outlook