

UNIVERSITY *of* WASHINGTON

Impacts of USGS-UW Generated M9 Ground Motions on Engineering Practice

Marc O. Eberhard

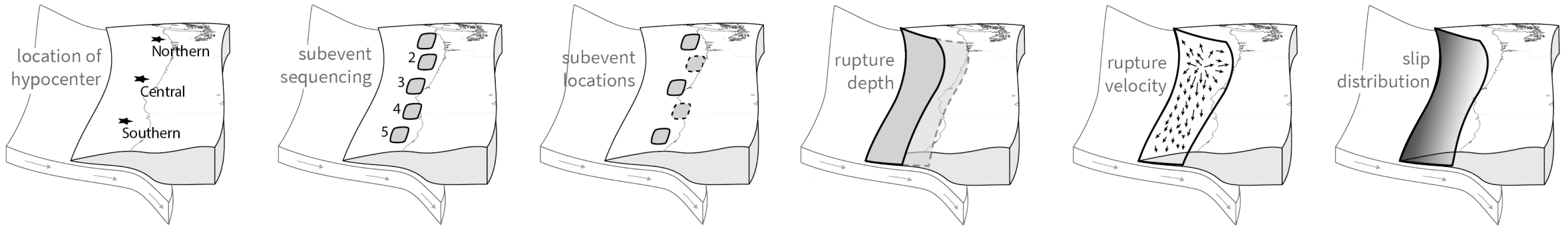
Jeffrey Berman

Brett Maurer

Civil and Environmental Engineering

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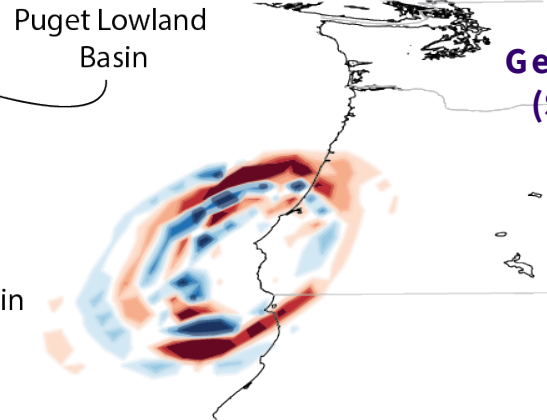
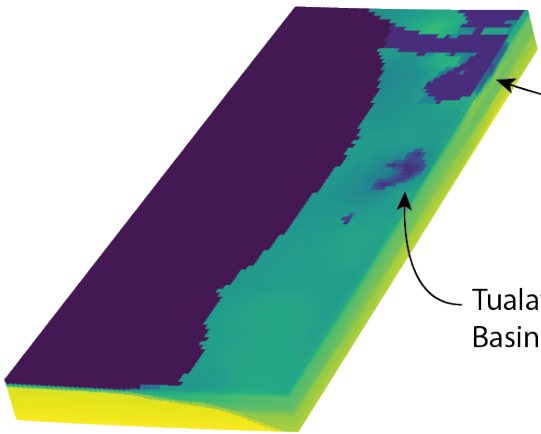
M9 CSZ Simulations



30 Sets of Rupture Parameters



Seismic Wave Velocity Model

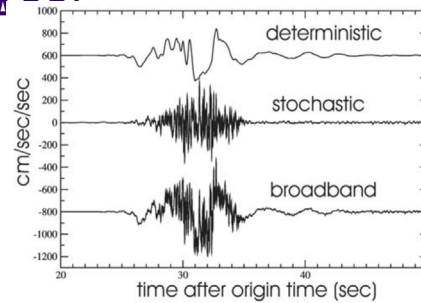


Finite-Difference Simulations

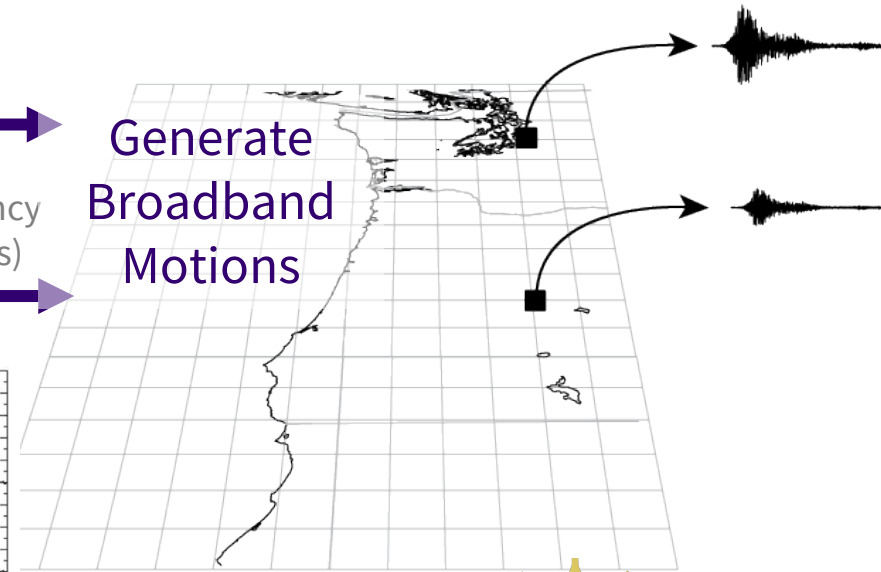
Low Frequency Motions (>1s)

Stochastically Generated Motions (SMSIM, Run on TA...

High Frequency Motions (<1s)



Generate Broadband Motions



Engineering-Seismology Workforce Development

M9

Name	UW Affiliation	Current Employer
Erin Wirth	ESS Post-Doc/Affiliate Asst. Prof.	USGS
Nasser Marafi	CEE PhD, Post-Doc	Risk Management Solutions
alex grant	CEE PhD	USGS
Andrew Makdisi	CEE PhD	USGS
Mike Greenfield	CEE PhD	Greenfield Geotechnical LLC
Zachary Kortum	CEE MSCE	USGS
Kan-Jen Liu	CEE MSCE	Sixense Group
Gloria de Zamacona Cervantes	CEE MSCE	Jacobs

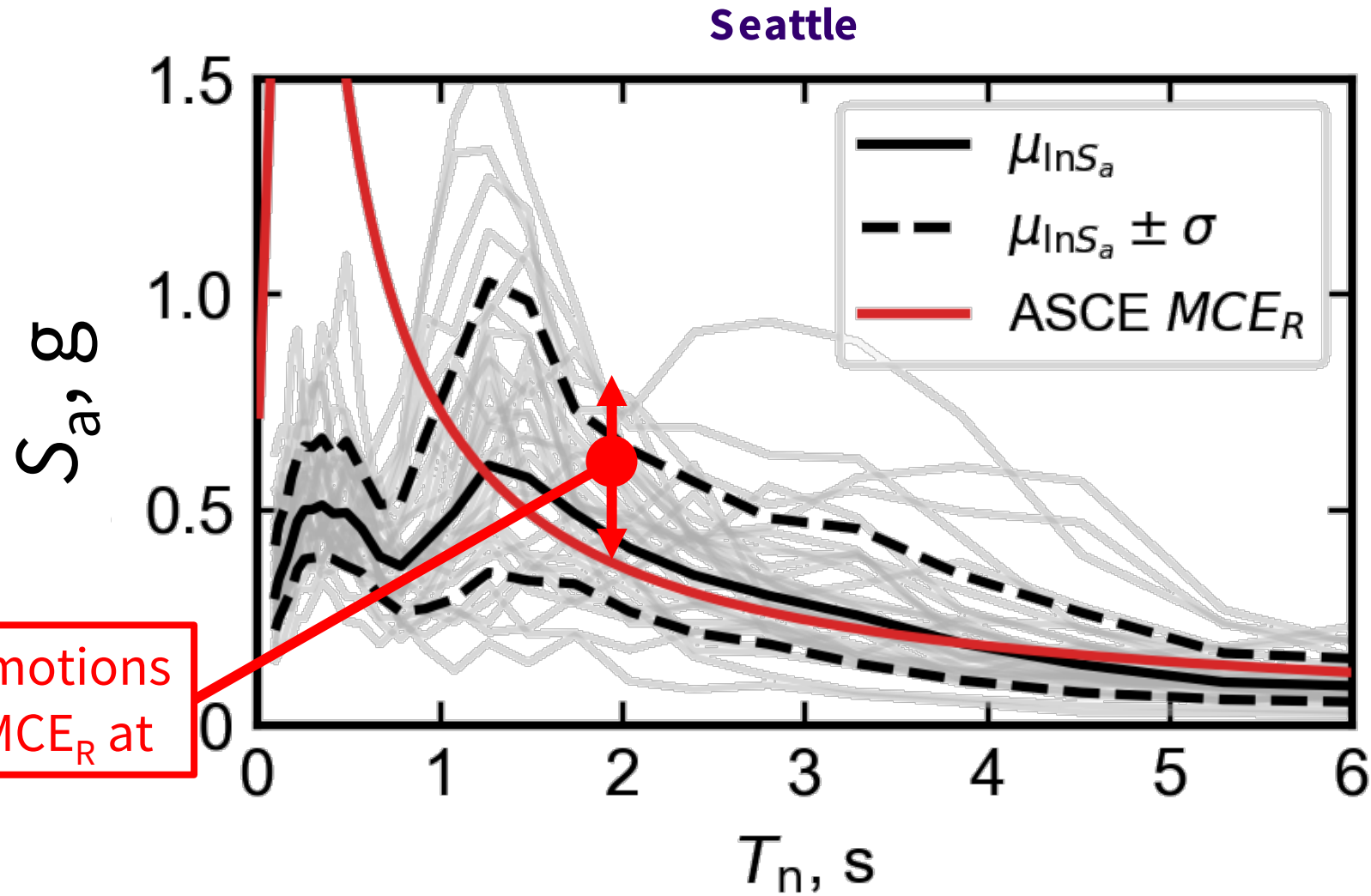
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Name	UW Affiliation
Audrey Dunham	ESS Post-doctoral scholar
Addie Lederman	CEE PhD (Exp.)
Rachel Zable	CEE MSCE (Exp.)



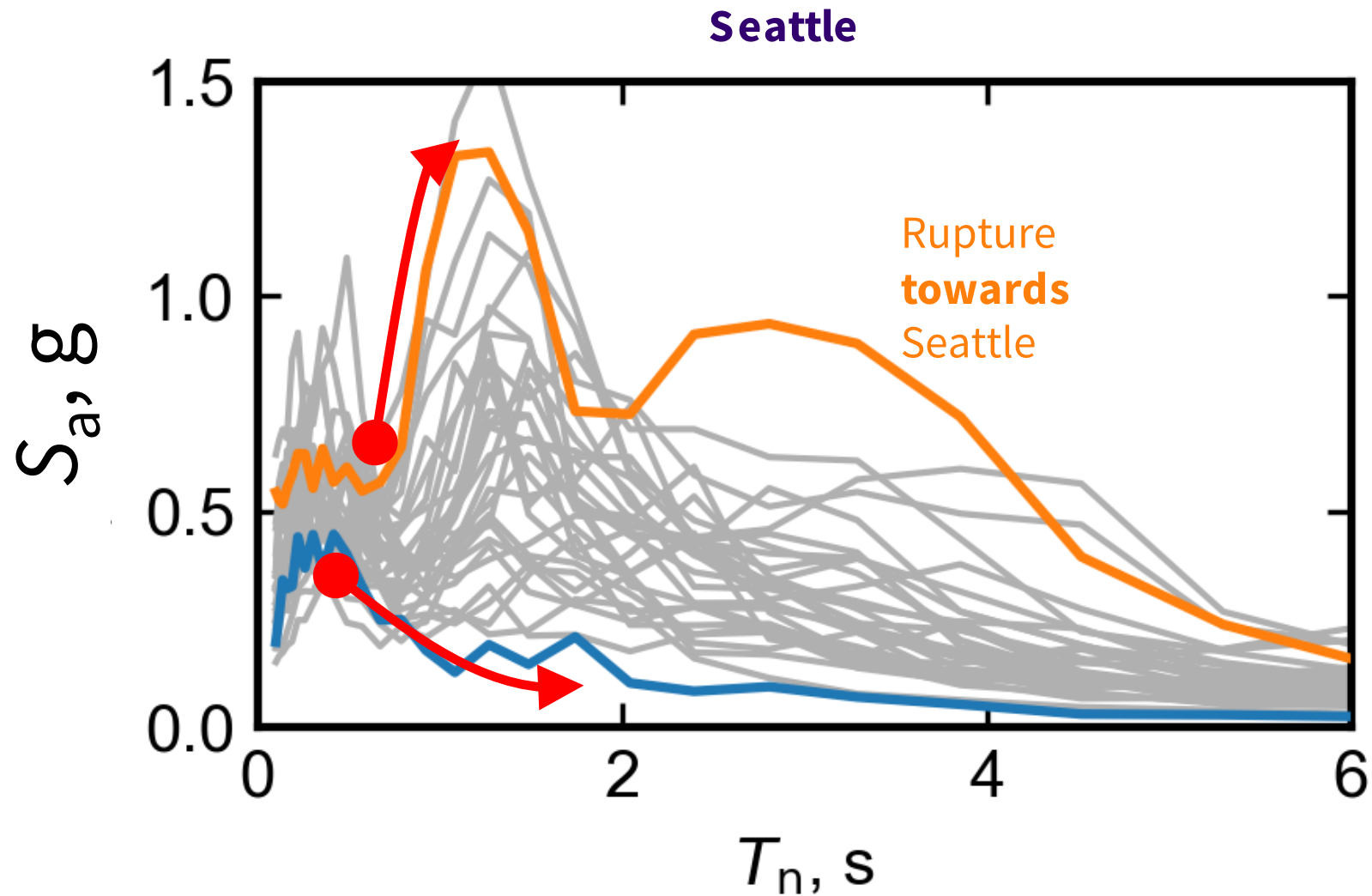
Key Finding: Effect of Seattle Basin on Spectral Accelerations



M9 Return Period less than that of MCE_R

20 out of 30 motions exceed MCE_R at 2s

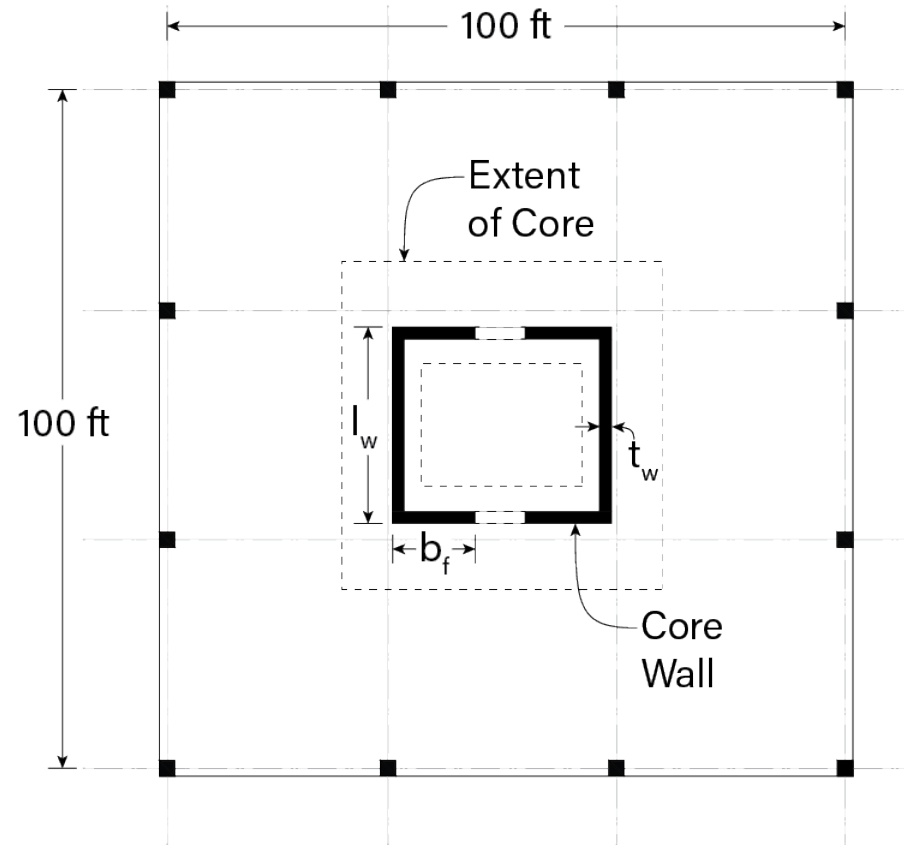
Key Finding: Importance of Spectral Shape



Frequency content at periods longer than initial period matters

RC Core Wall Archetype Development

- > 4 to 40 Stories
- > Tall residential buildings

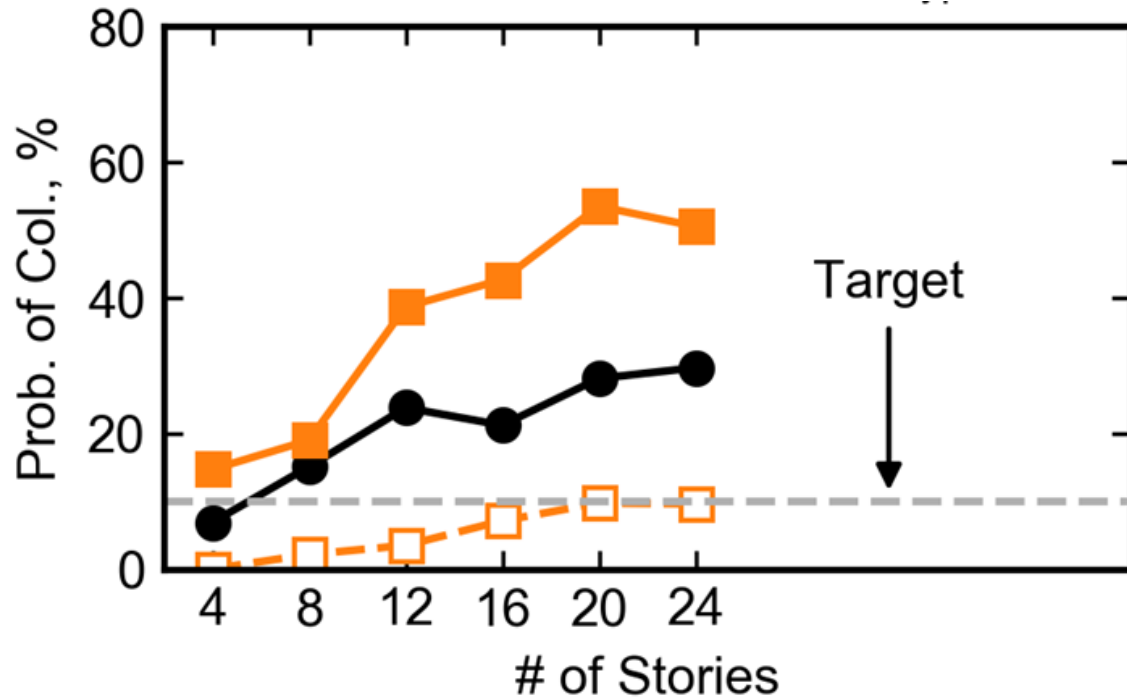


Archetype Development Committee

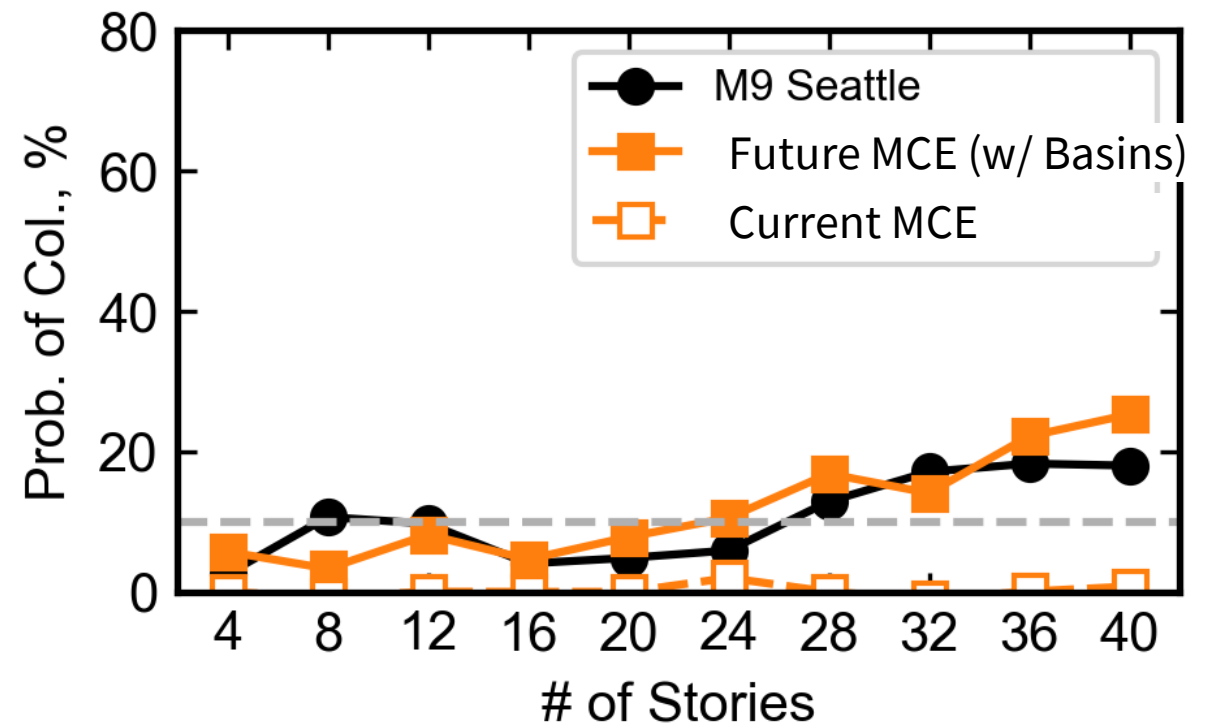


Probability of Collapse: Conditional on Occurrence of M9

Code Minimum (ASCE 7-16)

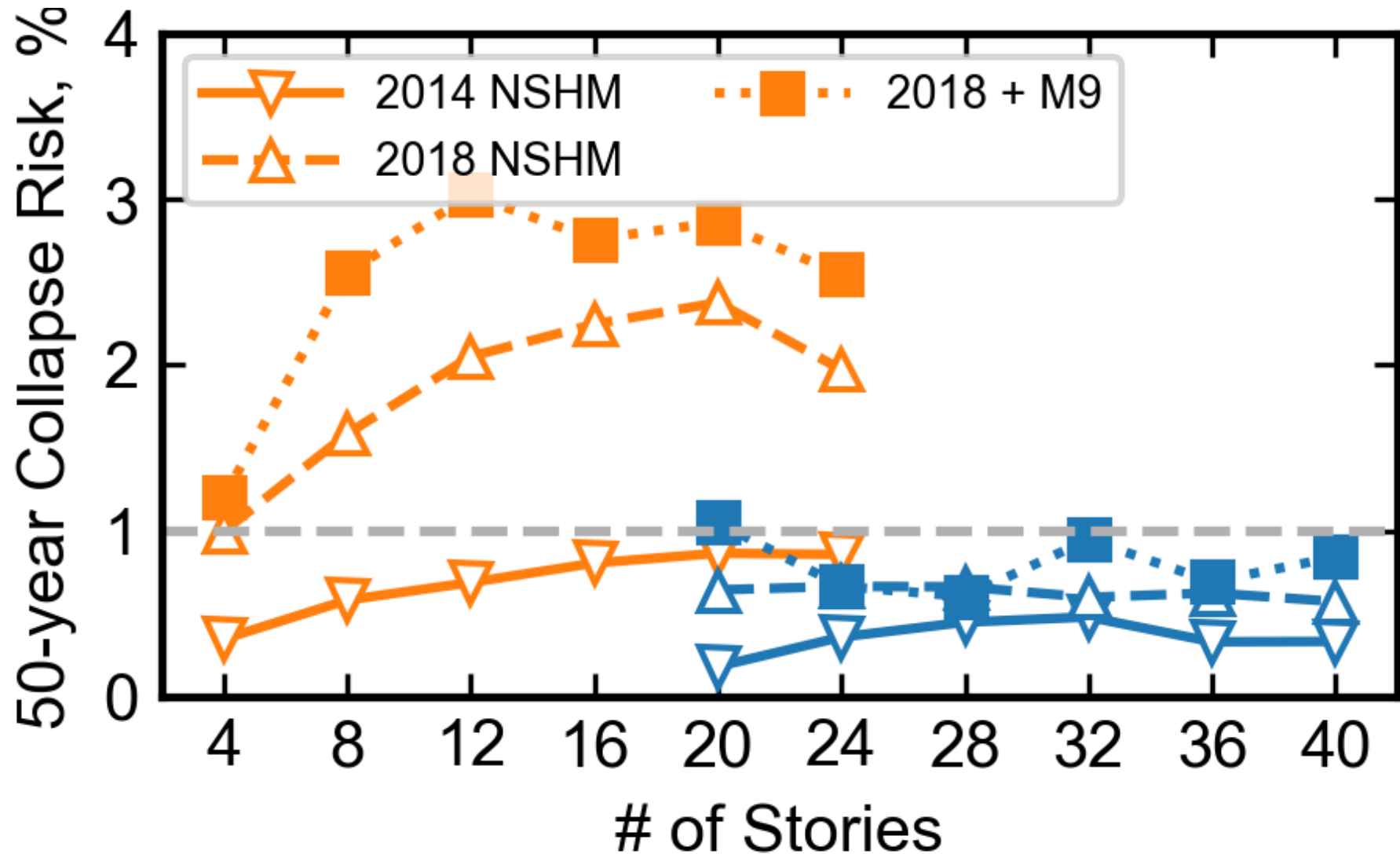


Code Enhanced (Tall Buildings ~2016 to Present)



50- Year Collapse Risk: Reference Archetypes

2016 Design
in Seattle



Code Impact



2018 Report on Incorporating Sedimentary Basin Response into the Design of Tall Buildings in Seattle, Washington

By Erin A. Wirth, Susan W. Chang, and Arthur D. Frankel

Geotechnical Engineering Group Supervisor -
City of Seattle

Open-File Report 2018-1149

Conclusions

USGS-UW M9 Collaboration/Ground Motions Have Had Great Impact on:

- > Workforce Development
- > Relationships with Industry
- > Understanding of Effects of Ground Motions
- > Design Practice