

# Statewide Catastrophic Incident Planning Team (SCIPT)

**6 November 2019, 1:00 – 4:00 PM**

**Camp Murray - Building 20 SEOC**

- I. **Welcome, Administrative Announcements, and Introductions** – Nichole Benardo, WA EMD
- II. **Critical Transportation Outreach Brief Out** – Michael Roberson, WA EMD
- III. **Fuel Planning Update** – Eli King, Energy Emergency Manager, State ESF 12
- IV. **BSST Update** – Dan Banks, WSDOT
- V. **State Catastrophic Incident Annex Planning Update** – Michael Roberson, WA EMD
- VI. **Logistics – Gap Identification and Analysis:**
  - a. **Staging Area Locations** – Mark Douglas, Logistics Supervisor
  - b. **CPODs** – Mark Douglas, Logistics Supervisor
  - c. **Navy Beach Landing Sites by Lat/Long** – Mark Douglas, Logistics Supervisor

~~BREAK~~
- VII. **RRAP Updates:**
  - a. **Transportation** – Brittney Miller, WSDOT
  - b. **Water Systems in Western & Central Washington** – Greg McKnight, Environmental Public Health Divisional Emergency Response Planner
  - c. **Airport Survivability** – Patrick Wright, Aviation Planner WSDOT
- VIII. **RCPGP Update** – Jason Biermann, Snohomish County DEM
- IX. **M9 Study Overview** – Marc Eberhard, University of Washington
- X. **Administrative Items:**
  - a. **Planning Framework Version 2** – Michael Roberson, WA EMD
  - b. **2020 Quarterly Schedule** – Nichole Benardo, WA EMD
- XI. **Good of the Order/Open Forum** - Nichole Benardo, WA EMD



## EMERGENCY MANAGEMENT DIVISION

*"A disaster-ready and resilient Washington State"*

# State Catastrophic Incident Planning Team Q4 Meeting

**06NOV2019**



# EMERGENCY MANAGEMENT DIVISION

"A disaster-ready and resilient Washington State"

# WELCOME

- Welcome
- Administrative Announcements
- Introductions
  - Name
  - Title
  - Where you work





## **Q 4 Meeting Agenda**

- I. Critical Transportation Outreach Brief Out** – Michael Roberson, WA EMD
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# Critical Transportation Outreach Brief Out

Date	HLS Region	Status
9/17/2019	6	Kickoff Meeting Complete
9/25/2019	1 – Snohomish County	Kickoff Meeting Complete
9/26/2019	1 – Skagit, Whatcom & San Juan Counties	Kickoff Meeting Complete
10/22/2019	5	Kickoff Meeting Complete
11/12/2019	8	Scheduled
11/13/2019	7	Scheduled
11/14/2019	3	Scheduled
11/19/2019	2	Scheduled
TBD	9	Awaiting addition of Spokane Fault to BSST
TBD	4	On Region 4 Feb Agenda to discuss



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# Fuel Planning Update

- Eli King, Energy Emergency Manager, State ESF 12



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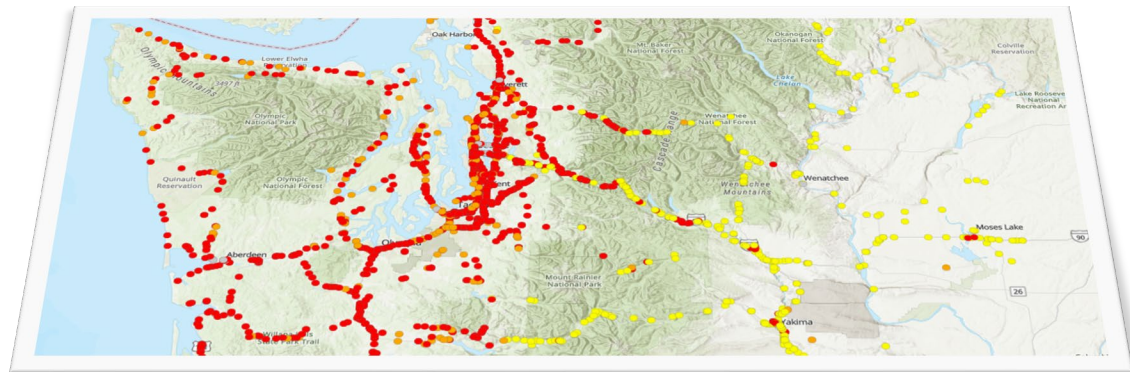
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# BSST Update

- Dan Banks, WSDOT
- <https://wsdot.maps.arcgis.com/home/webmap/viewer.html?useExisting=1&layers=8196b518702343ef82fec575f9581b2a>





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# Washington State Catastrophic Incident Planning Update

**November 2019**



## Catastrophic Incident Annex (CIA) Structure to the State CEMP

- The Catastrophic Incident Annex closely aligns with the Framework.
- Changes language of life saving and sustaining strategies to capabilities to better align with the new Washington State Comprehensive Management Plan (CEMP) and federal guidance
  - CEMP Base Plan
    - CIA All Catastrophe Annex
      - CSZ
      - Volcano
      - Pandemic
      - Radiological
- Anticipated promulgation of the (CIA) All Catastrophe's Base Plan end of 2019

### New Catastrophic Incident Annex Structure

- I. **Purpose**
  - a. Executive Summary
  - b. Mission
  - c. Strategic Goals
    - i. Life Safety
    - ii. Incident Stabilization
- II. **Authorities and Policies**
  - a. Revised Code of Washington (RCW)
  - b. Washington Advisory Code (WAC)
- III. **Situation Overview**
  - a. Senior Leaders' Intent
  - b. Concept of Operations
  - c. Interagency Response, Actions, and Activities
- IV. **Concept of Operations**
  - a. Leadership Intent
  - b. Primary / Supporting Capabilities
- V. **Organization**
  - a. Structure
- VI. **Direction, Control, & Coordination**
  - a. Horizontal Integration
  - b. Vertical Integration
- VII. **Information Collection, Analysis & Dissemination**
  - a. Information Collection
    - i. Community Lifelines
    - ii. Connection to Core Capabilities
    - iii. Essential Elements of Information (EEI)
- VIII. **Responsibilities**
  - a. Critical Transportation
  - b. Mass Care Services
  - c. Public Health, Healthcare, EMS
  - d. Fatality Management
  - e. Infrastructure Systems
- IX. **References and Supporting Guidance**
- X. **Terms and Definitions**



# EMERGENCY MANAGEMENT DIVISION

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## Strategy and Core Capability Model (Existing Model)

## Primary and Supporting Capability Model (New Model)

### • Strategies

- Critical Transportation
- Mass Care Services
- Public Health, Healthcare, EMS, Mortuary Services
- Fatality Management
- Utilities Restoration: Energy, water and wastewater, and Information Communications Technologies

### • Core Capabilities

- Logistics and Supply Chain Management
- Operational Communication
- Operational Coordination
- Situational Assessment

### • Primary Capabilities

- Critical Transportation
- Mass Care Services
- Public Health, Healthcare, EMS
- Fatality Management
  - Mortuary Services
- Infrastructure Systems
  - Energy
    - Grid
    - Fuel
  - Water
  - Waste Water
  - Communications
    - Information Communications Technology

### • Supporting Capabilities

- Logistics and Supply Chain Management
- Operational Communication
- Operational Coordination
- Situational Assessment



**Cascadia Rising 2022**  
**Concepts and Objectives Meeting**  
**Wednesday December 4, 2019**  
**9:00 AM – 12:00 PM**  
**Camp Murray, Building 80**



# Contact Information

**Michael Roberson**

**Planning Supervisor**

**Emergency Management Division**

**Washington Military Department**

**253-625-3943**

**[michael.roberson@mil.wa.gov](mailto:michael.roberson@mil.wa.gov)**



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# **Logistics – Gap Identification & Analysis**

- **Mark Douglas, WA EMD Logistics Supervisor**



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**Break**



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WSDOT



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# RCPGP Update

- **Jason Biermann, Snohomish County DEM**



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# M9 Study Overview

- **Marc Eberhard, University of Washington**



## **Closing**

- **Administrative Items**
  - Planning Framework Version 2
  - 2020 Quarterly Schedule
- **Good of the Order/Open Forum**



## EMERGENCY MANAGEMENT DIVISION

*"A disaster-ready and resilient Washington State"*



**Thank You  
Veterans**



# Effects of Cascadia Subduction Zone M9 Earthquakes

*Marc Eberhard, Professor*

*Jeffrey Berman, Professor*

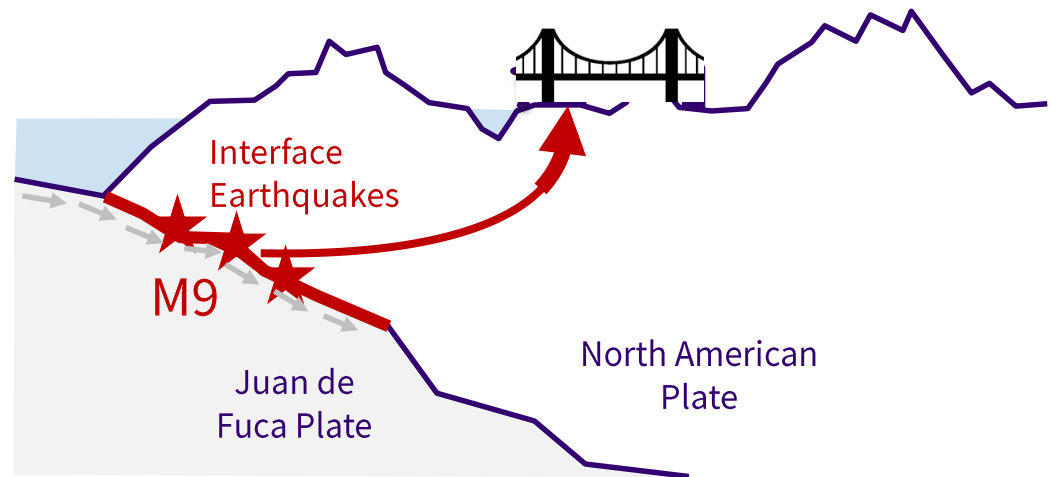
*Nasser A. Marafi, Postdoctoral Research Associate*

*Brett Maurer, Assistant Professor*

*University of Washington*

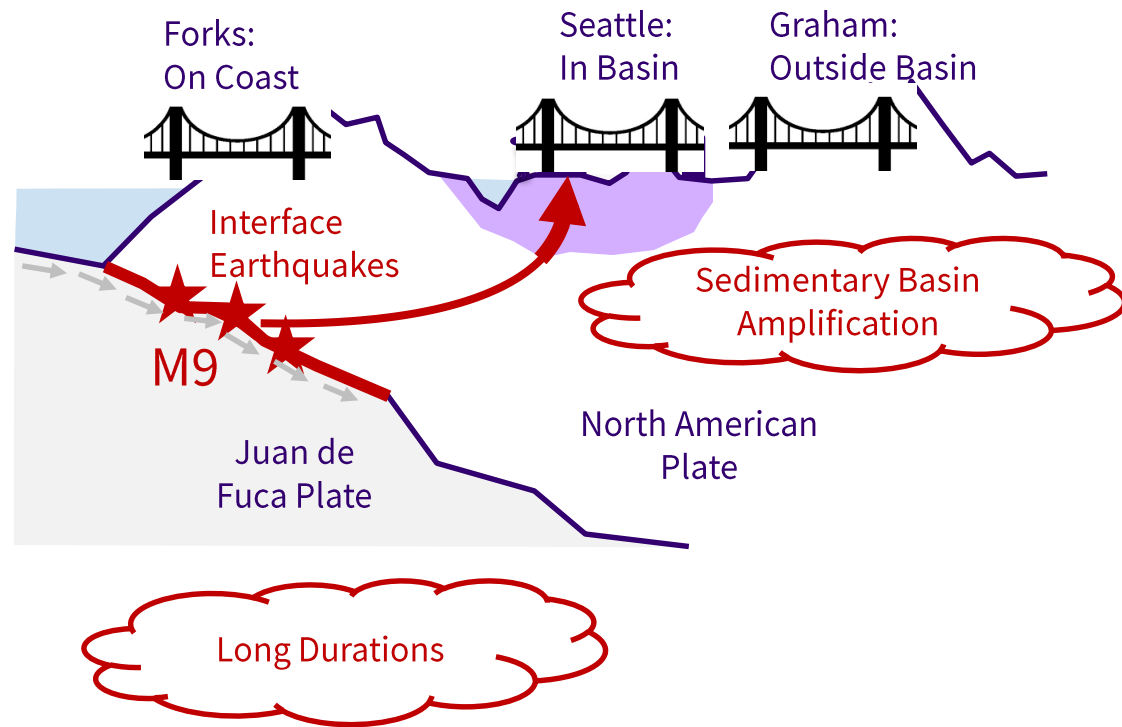
# Cascadia Subduction Zone M9 Earthquake

- 10% Chance of ~M9 Occurring in 50 Years
- Likely to Cause:
  - Tsunamis
  - Ground Shaking
  - Landslides
  - Liquefaction
- Initial Damage to:
  - Ports, Airports
  - Lifelines (roads, utilities, etc.)
  - Buildings
  - **Bridges**
- Effects on:
  - Response
  - Recovery



# Cascadia Subduction Zone M9 Earthquake

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# M9 Project

NSF EAR-1331412

PI Alison Duvall, Earth and Space Sciences

Former-PI John Vidale (now at USC)

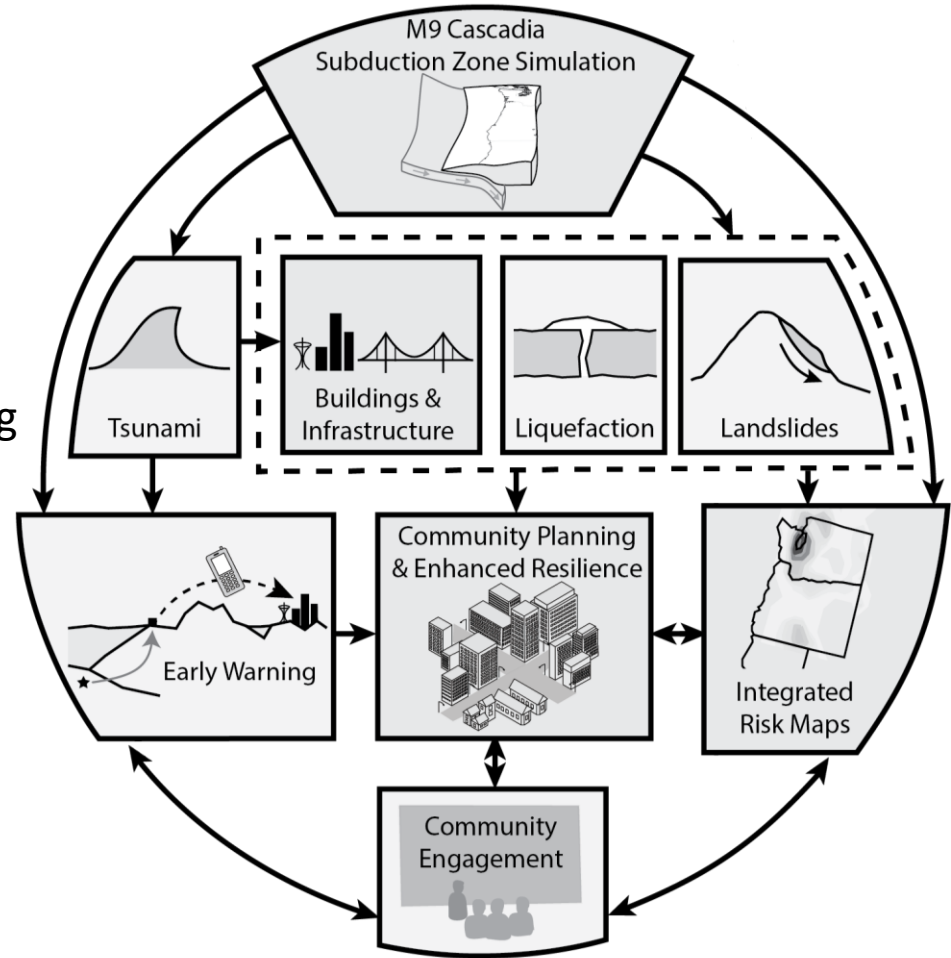
Co-PIs:

Dan Abramson, Urban Design and Planning

Jeff Berman, Civil & Environmental Engineering

Ann Bostrom, Daniel J. Evans School of Public Policy & Governance

Art Frankel, U.S. Geological Survey



# M9 Project



Department of Geology and Mineral Industries  
Administrative Office  
800 NE Oregon St., #20, Suite 965  
Portland, OR 97232-2162  
(971) 673-1555  
Fax: (971) 673-1562  
www.oregongeology.org



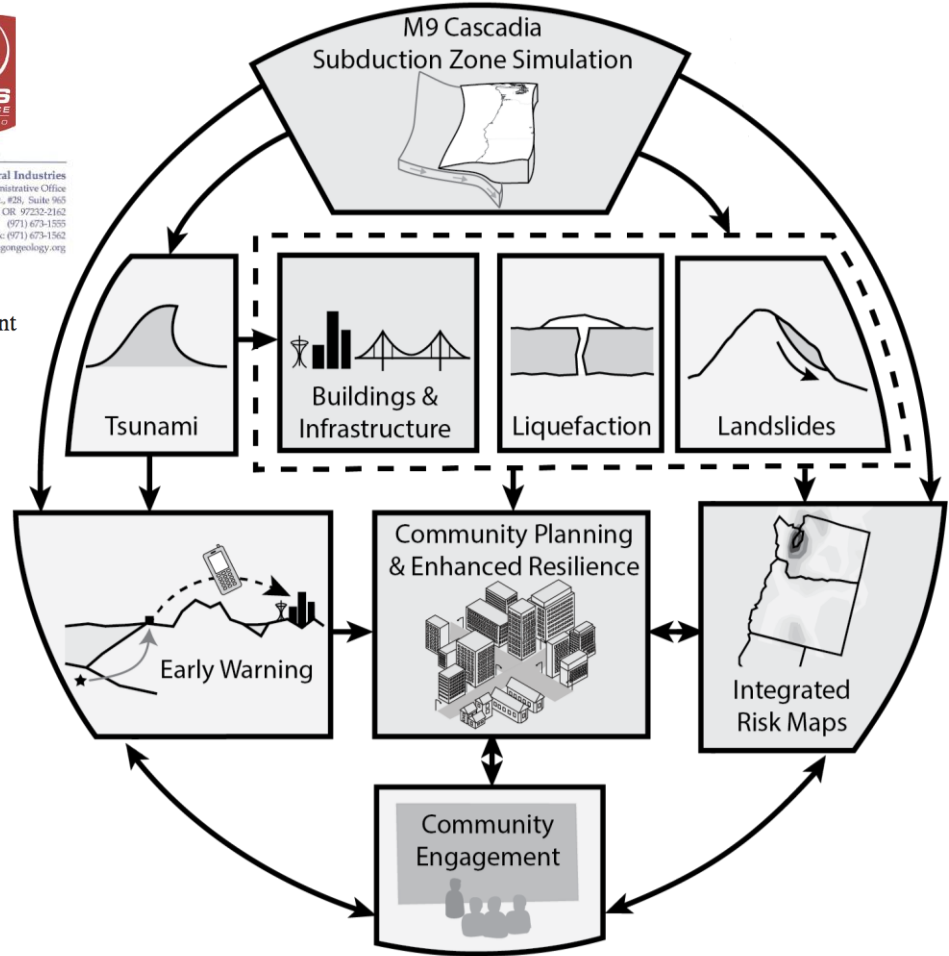
The National Center for Airborne Laser Mapping  
UNIVERSITY OF HOUSTON • UNIVERSITY OF CALIFORNIA, Berkeley



City of Seattle  
Seattle Police Department



STATE OF WASHINGTON  
MILITARY DEPARTMENT  
EMERGENCY MANAGEMENT DIVISION



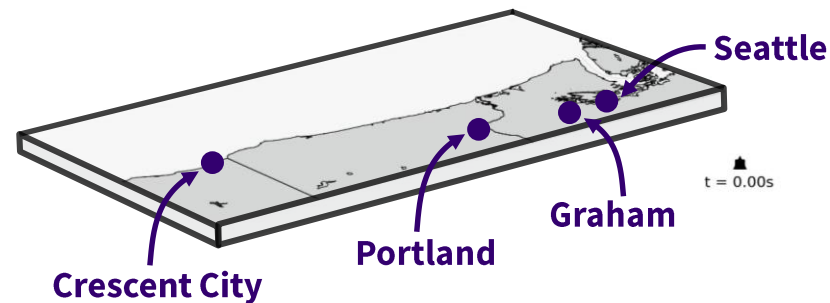


# M9 Project – Ground Motions



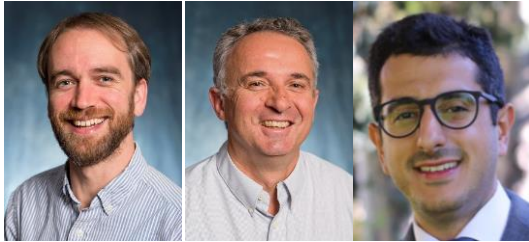
Art Frankel  
Erin Wirth  
\*Nasser Marafi  
John Vidale  
\*Ian Stone  
\*Mika Thompson

- **50 Cascadia earthquake realizations** publicly available on DesignSafe
- Improved understanding of **shaking amplification by the Seattle basin**



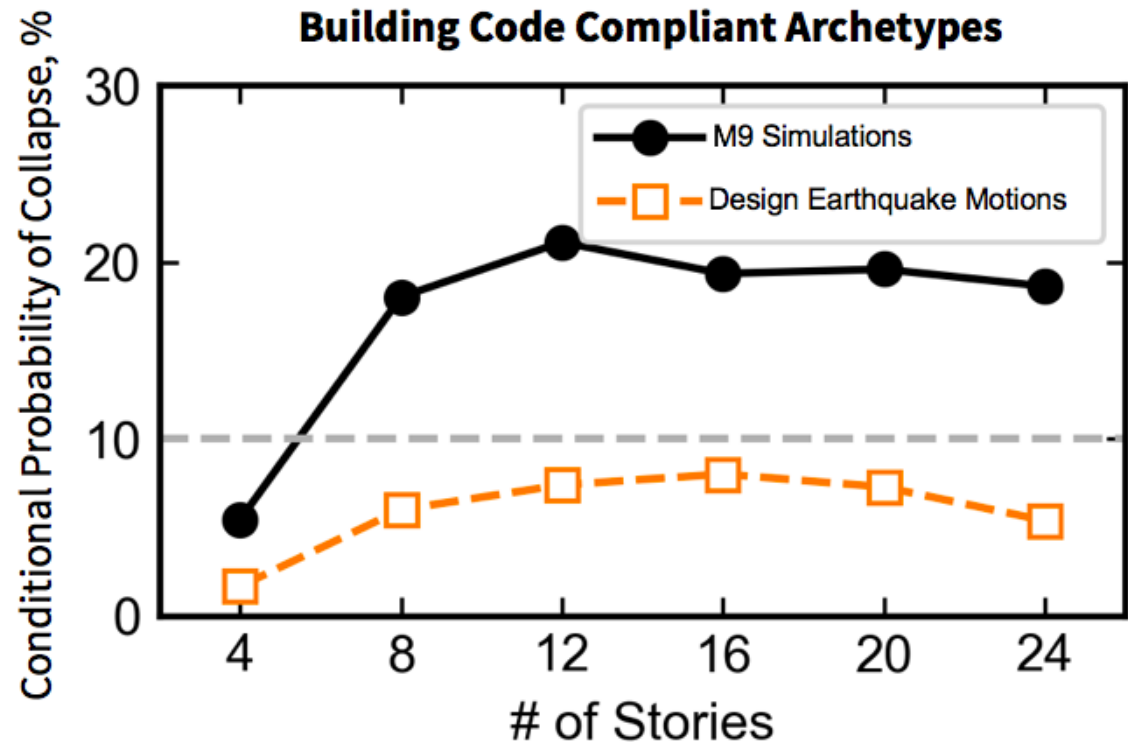
Rupturing **towards** Seattle

# M9 Project – Tall Buildings



Jeff Berman  
Marc Eberhard  
\*Nasser Marafi

- Recommendations for the **design of tall buildings**
- **Implemented** by City of Seattle (2018)

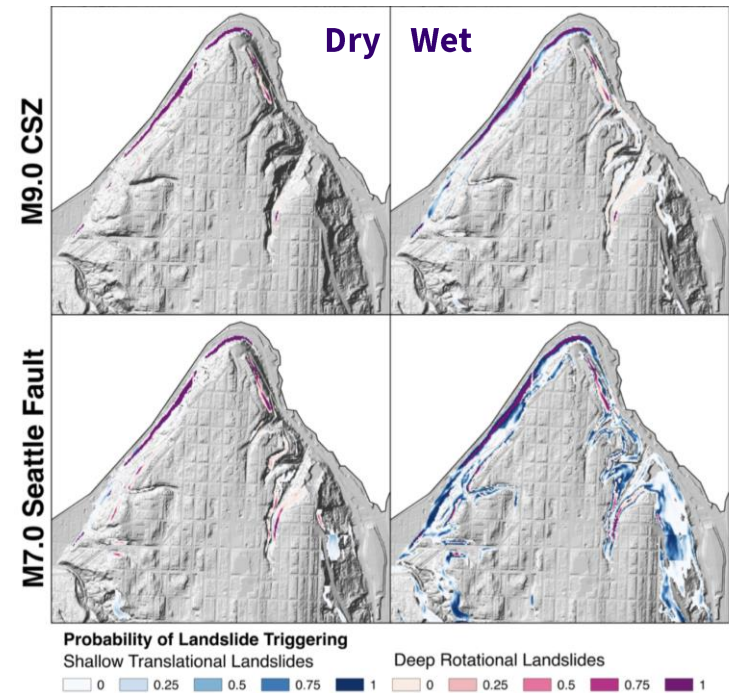


# M9 Project – Landslides

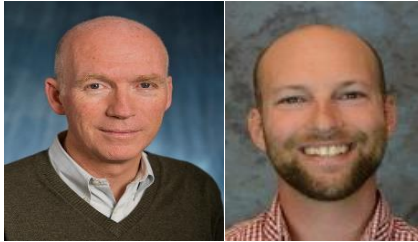


Joe Wartman  
Alison Duvall  
Dave Montgomery  
\*Alex Grant  
\*Sean LaHusen

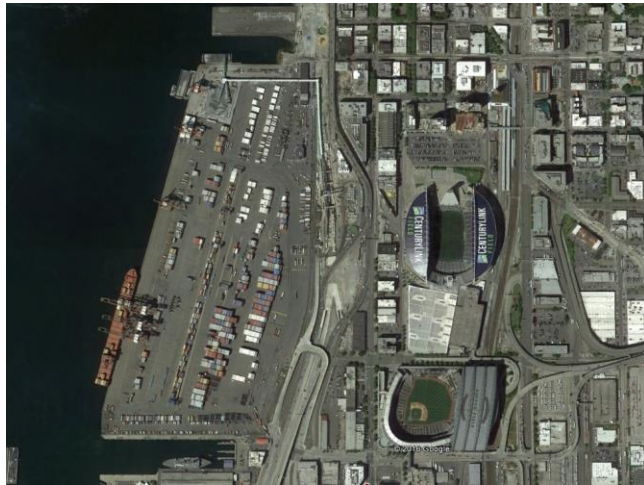
- Created **landslide inventory** for Oregon Coast Range & advanced probabilistic **modeling of coseismic landslides**



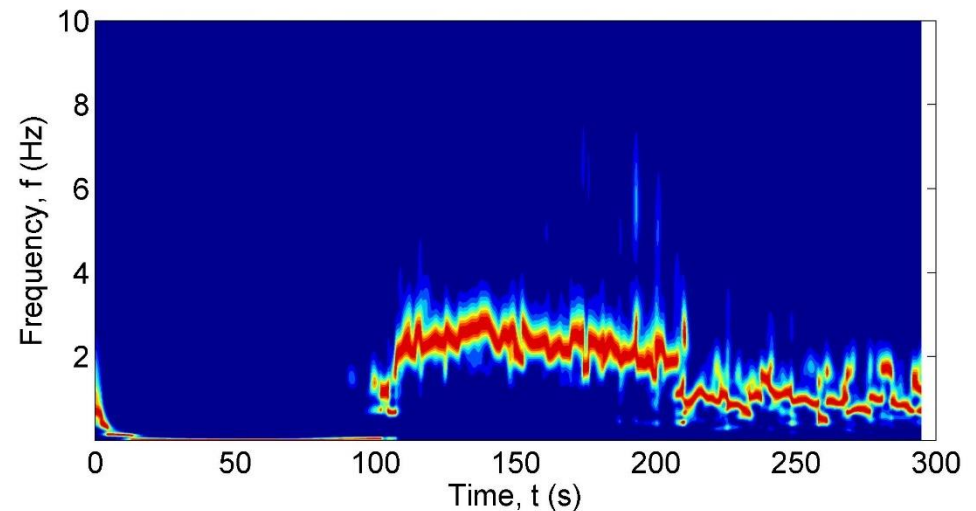
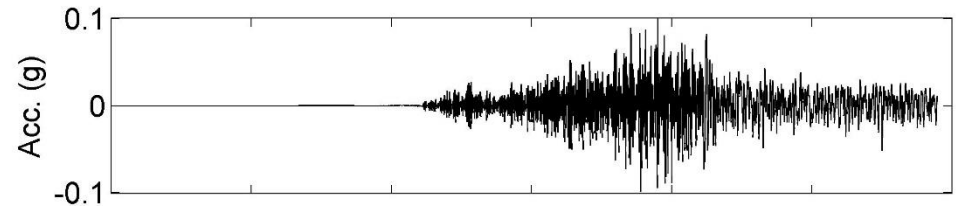
# M9 Project – Soil Liquefaction



Steve Kramer  
\*Mike Greenfield



Liquefaction involves the incremental generation of porewater pressure, and thus is sensitive to the duration of a ground motion.



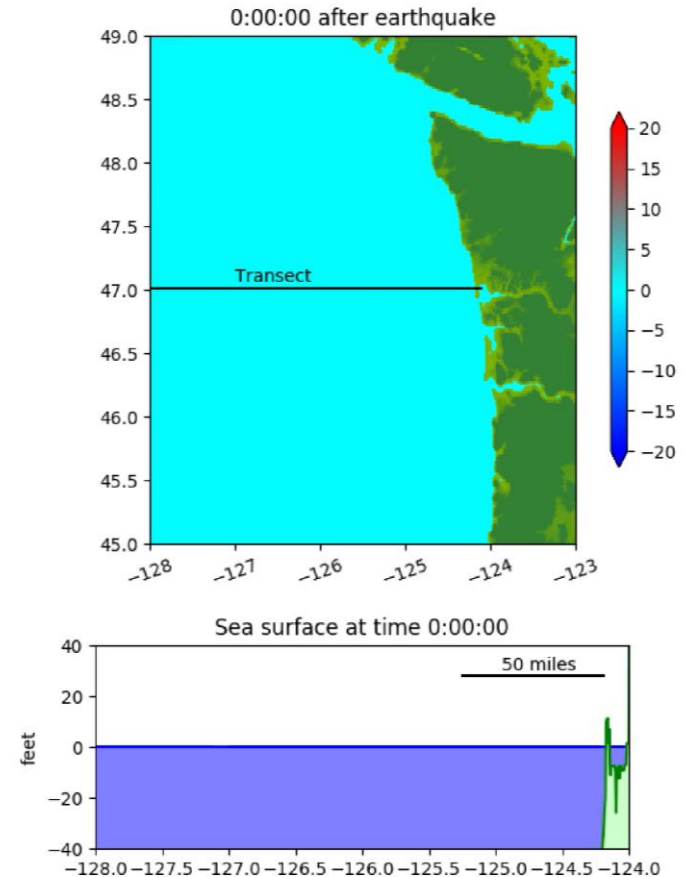
- Investigated the effects of long-duration ground motions on liquefaction triggering and damage

# M9 Project – Tsunamis

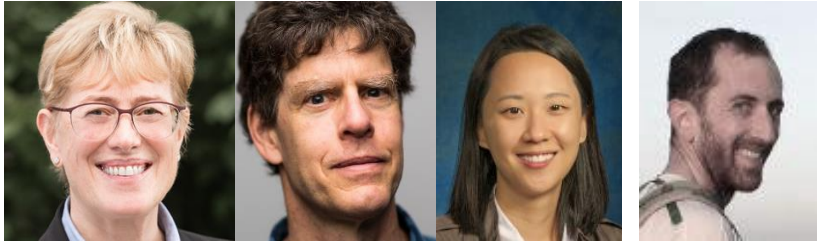


**Randy LeVeque**  
**Frank Gonzalez**  
**Mike Motley**  
**\*Xinseng (Shawn) Qin**

- Advanced probabilistic modeling of tsunami inundation scenarios



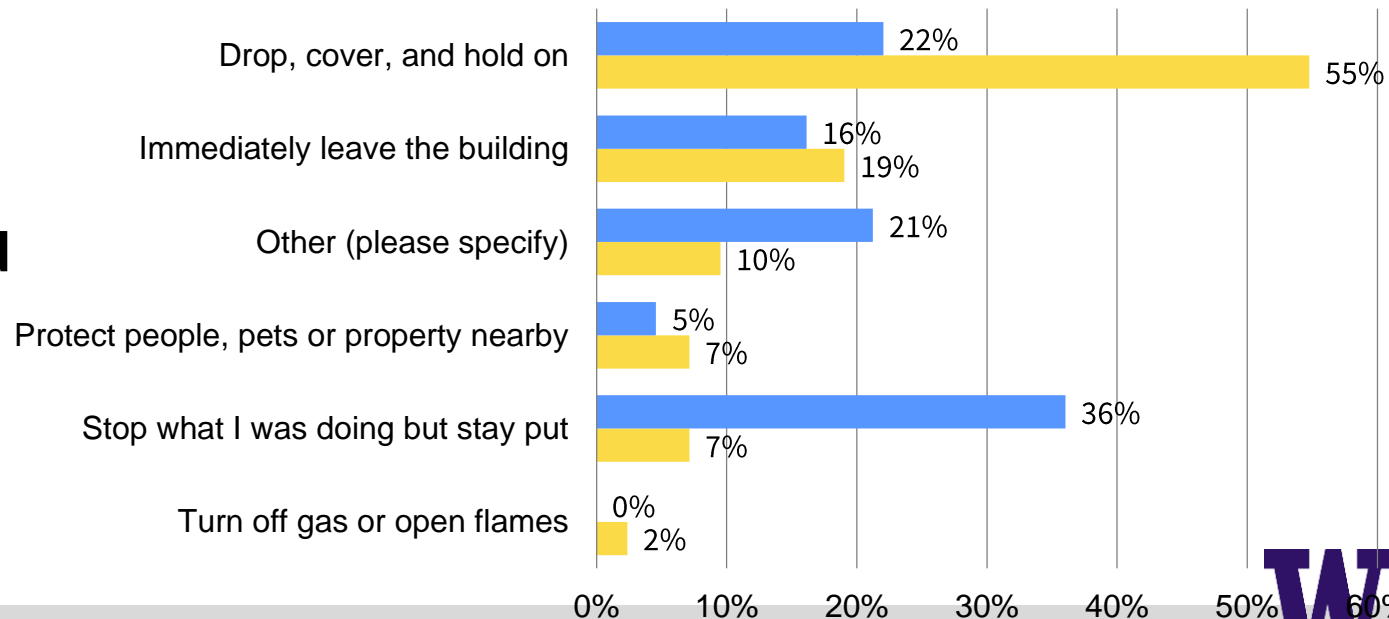
# M9 Project – Influences of Perceptions on Preparedness



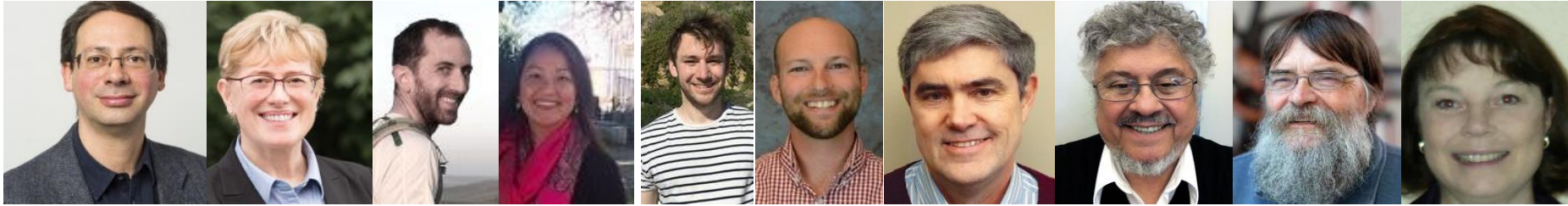
Ann Bostrom  
John Vidale  
\*Alicia Ahn  
\*Peter Dunn

- Advanced understanding of **how perceptions influence earthquake preparedness and preferences for earthquake early warning**

- What was your first response during the shaking for your most memorable earthquake experience?
- If you were to experience an earthquake when you were indoors, what do you think your first response would be during the shaking?



# M9 Project – Planning and Mitigation Workshops



**Dan Abramson  
Ann Bostrom  
\*Peter Dunn**

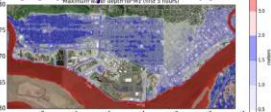
**\*Lan Nguyen  
\*Alex Grant  
\*Mike Greenfield**

**Randy LeVeque,  
Frank Gonzales,  
Peter Guttorp  
Loyce Adams**

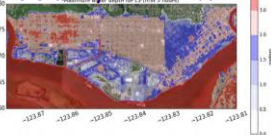
**SM1 Event – expected minimum flooding in CSZ event**



**M1 Event  
75% of CSZ events may flood this much**



**L1 Event  
20% of CSZ events may flood this much**



- Led multiple **community planning & hazard mitigation workshops**

# Follow-Up Projects

–Effects of Local Site Conditions, 2019-2020. (USGS/WSDOT)



–Impacts of M9 Earthquakes on Bridges, 2020-2021. (WSDOT)



–Public Communication Tools, 2020-2022. (Abramson, NSF)



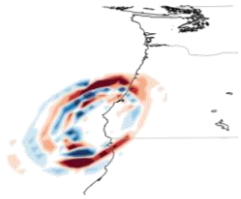
–Research Coordination Network. (Bostrom, NSF, Under Review)



*What About Bridges???*

# Outline

M9  
Simulations



Properties of  
Ground  
Motions



Effects of 1D Site  
Amplification

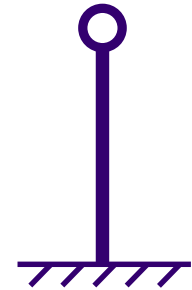
Surface



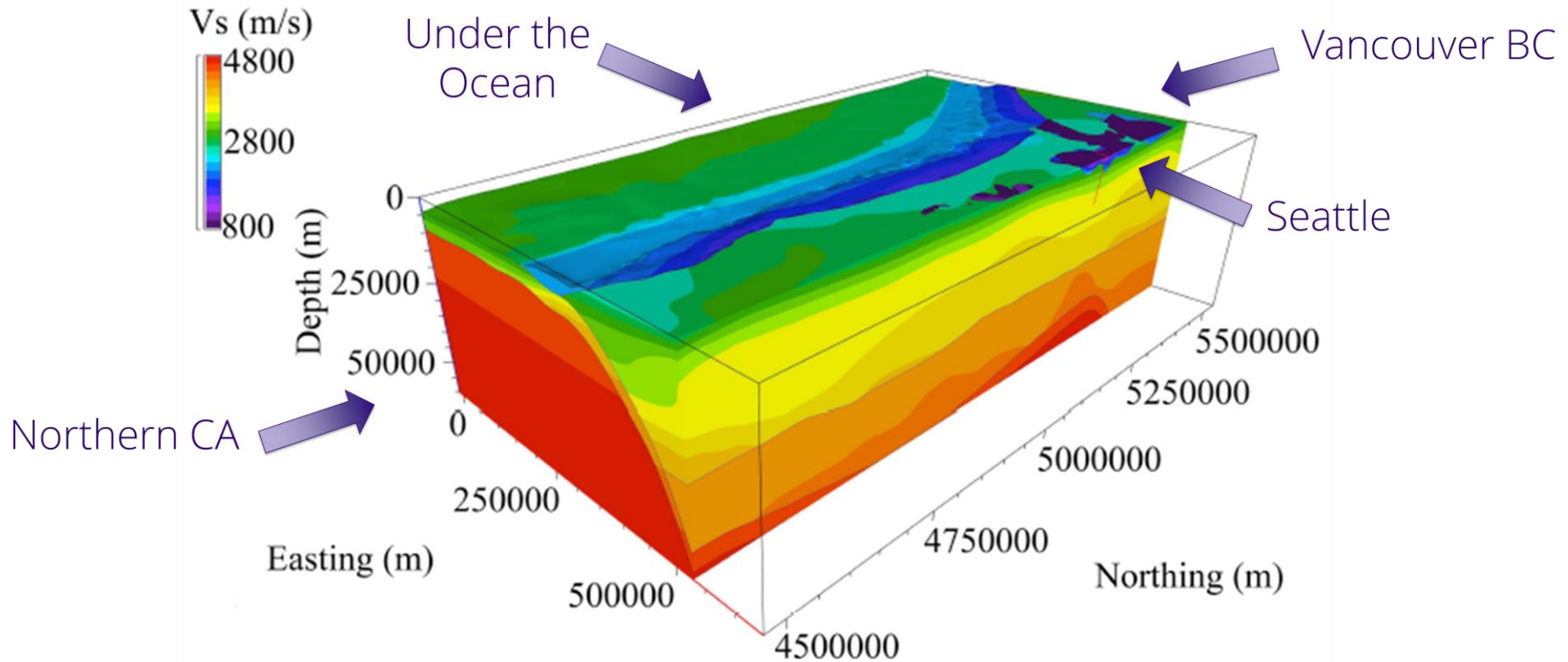
$V_s = 600$   
m/s



Performance of  
Idealized Bridges

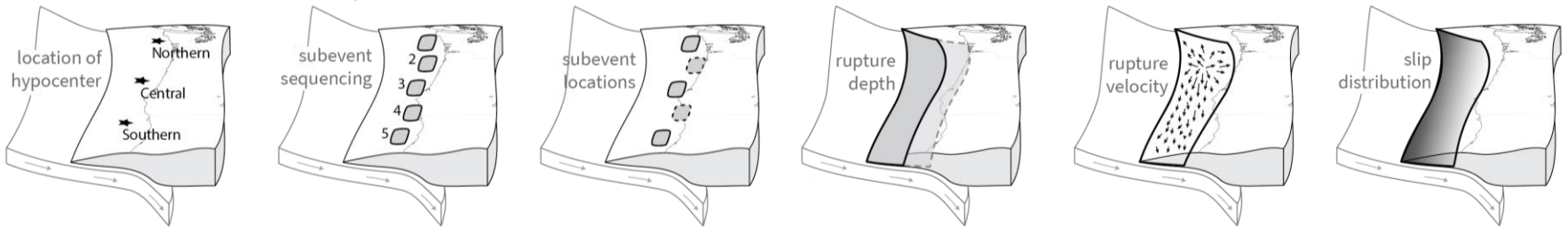


# PNW Seismic Wave Velocity Model (Stephenson, USGS)



Reference: Frankel, A., Wirth, E., Marafi, N., Vidale, J., Stephenson., W. "Broadband Synthetic Seismograms for Magnitude 9 Earthquakes on the Cascadia Megathrust Based on 3D Simulations and Stochastic Synthetics", BSSA, 2018

# M9 CSZ Simulations (Art Frankel and Erin Wirth, USGS)



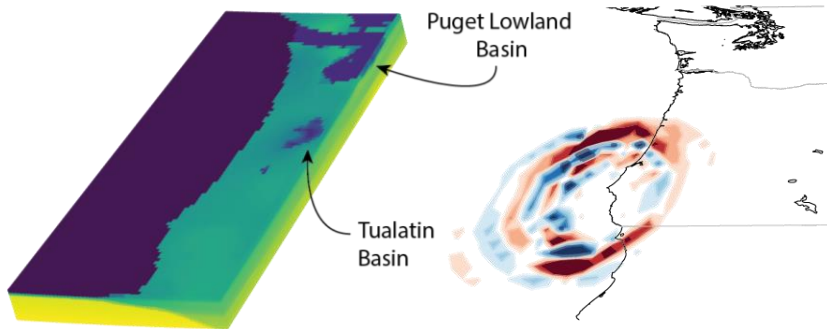
Selecting Rupture Parameters



Seismic Wave Velocity Model



Finite-Difference Simulations



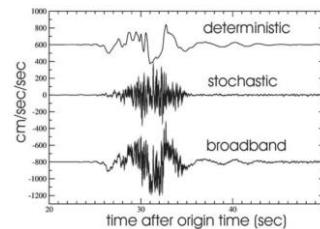
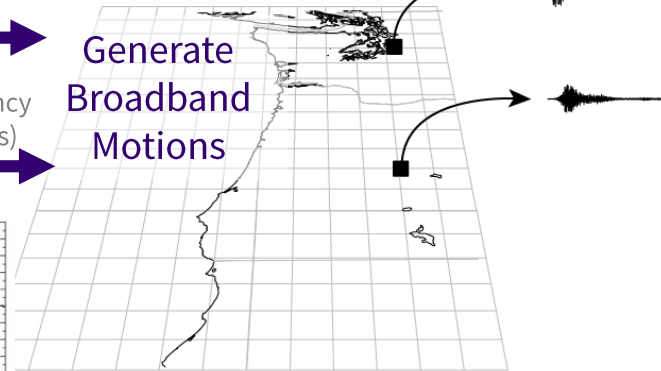
Low Frequency Motions (>1s)



Generate Broadband Motions

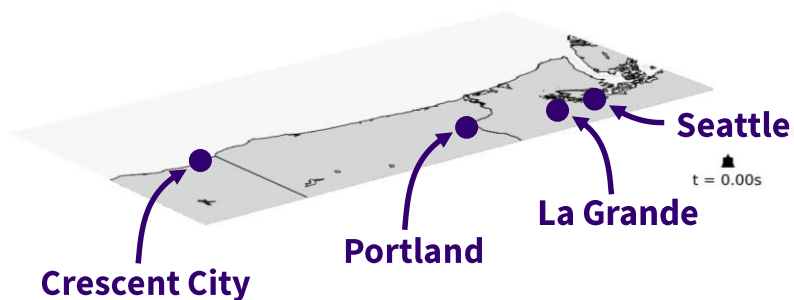
Stochastically Generated Motions

High Frequency Motions (<1s)

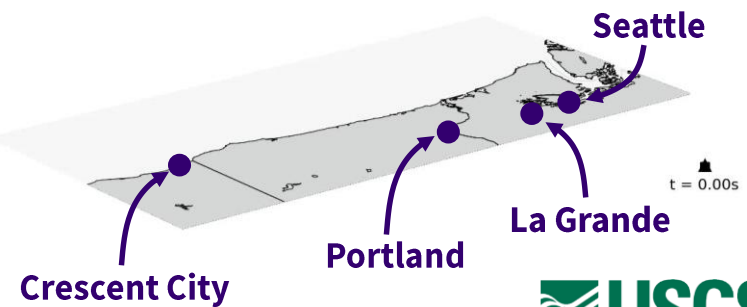


# Two Example Realizations

Realization #1: Rupturing **towards** Seattle



Realization #2: Rupturing **away** from Seattle



# Time Histories

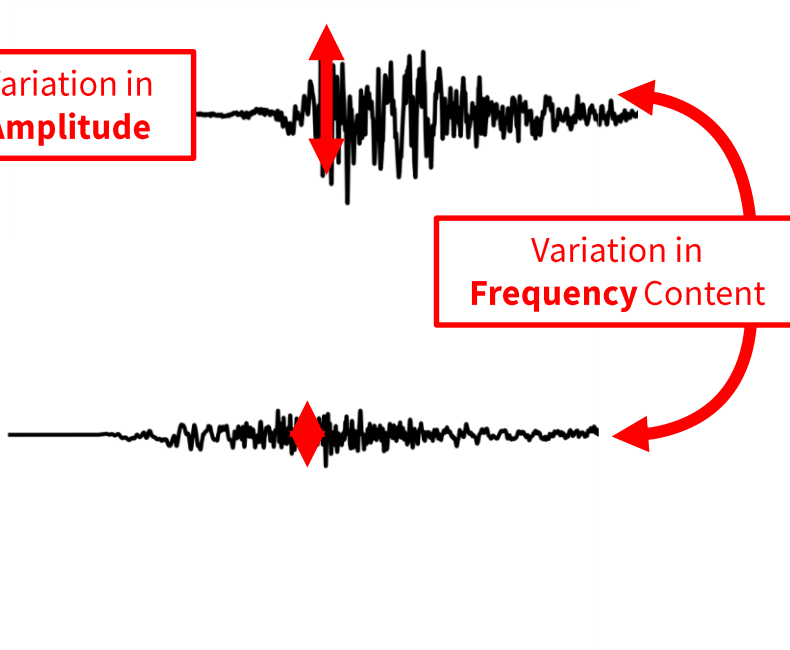
Seattle  
(in basin)

Realization #1  
*(towards Seattle)*

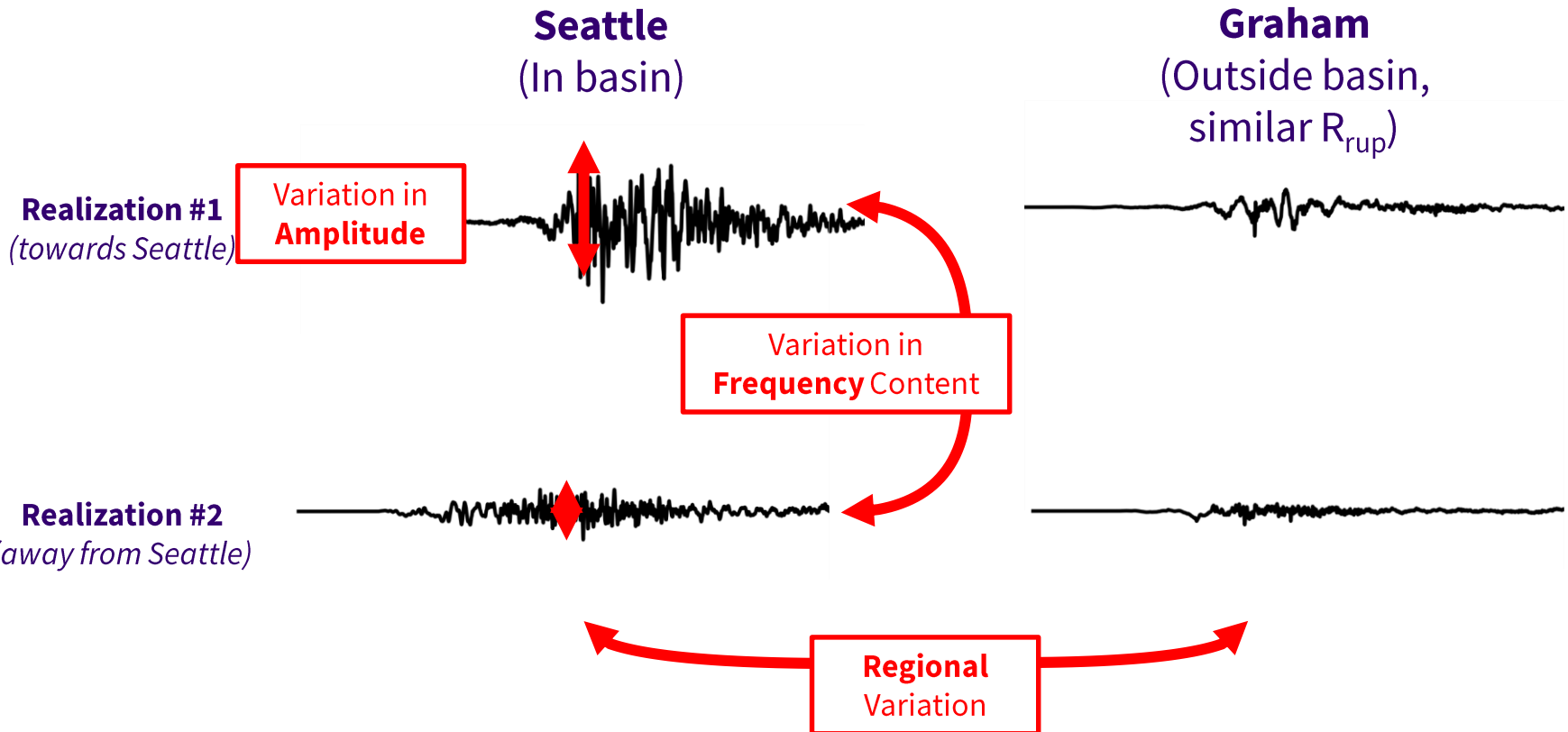
Variation in  
**Amplitude**

Variation in  
**Frequency Content**

Realization #2  
*(away from Seattle)*

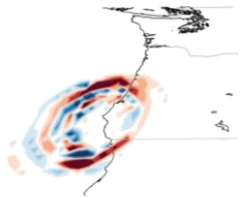


# Time Histories



# Outline

M9  
Simulations



## Properties of Ground Motions

- Acceleration
- Response Spectra
- Spectral Shape
- Duration



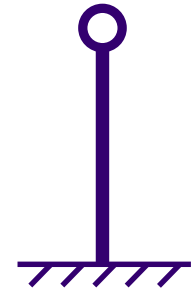
Effects of 1D Site  
Amplification

Surface



$V_s = 600$   
m/s

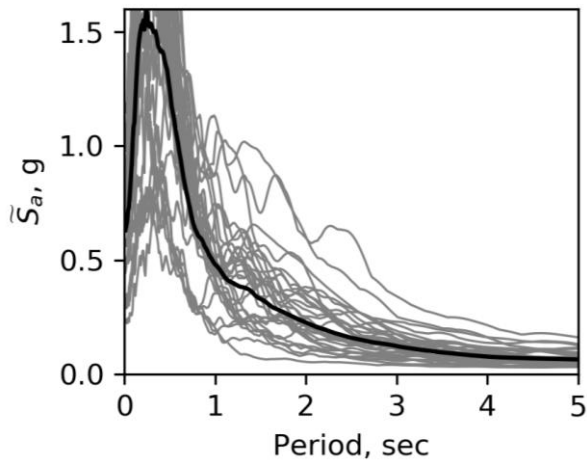
Performance of  
Idealized Bridges



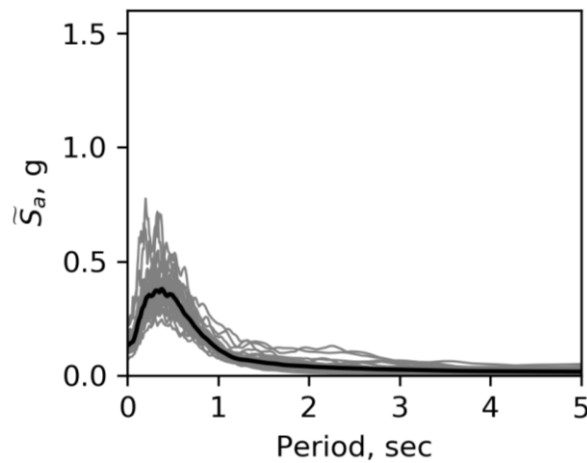


# Acceleration Response Spectra, $S_a$

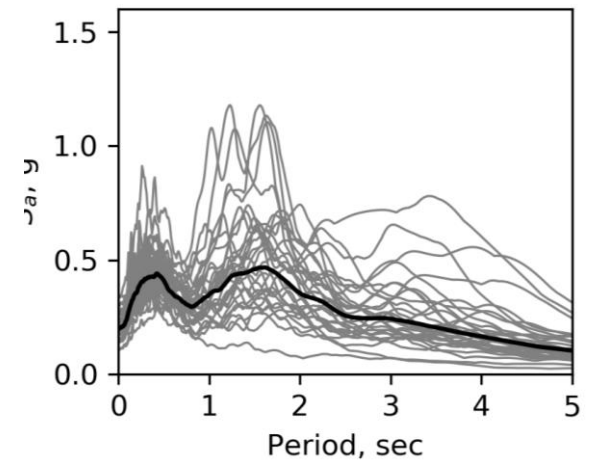
Forks



Graham



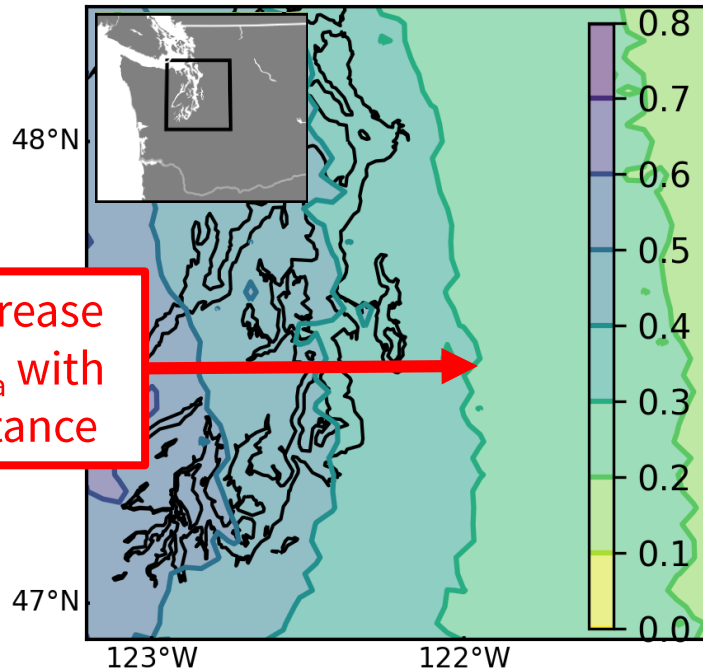
Seattle



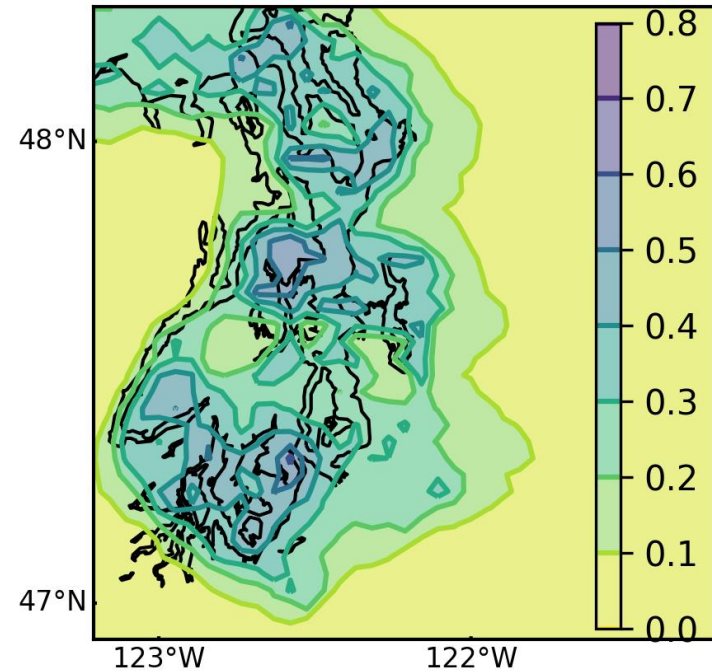
— Realization  
— Geometric Mean

# Regional Variation of $S_a$

$\bar{S}_a(0.50s)$

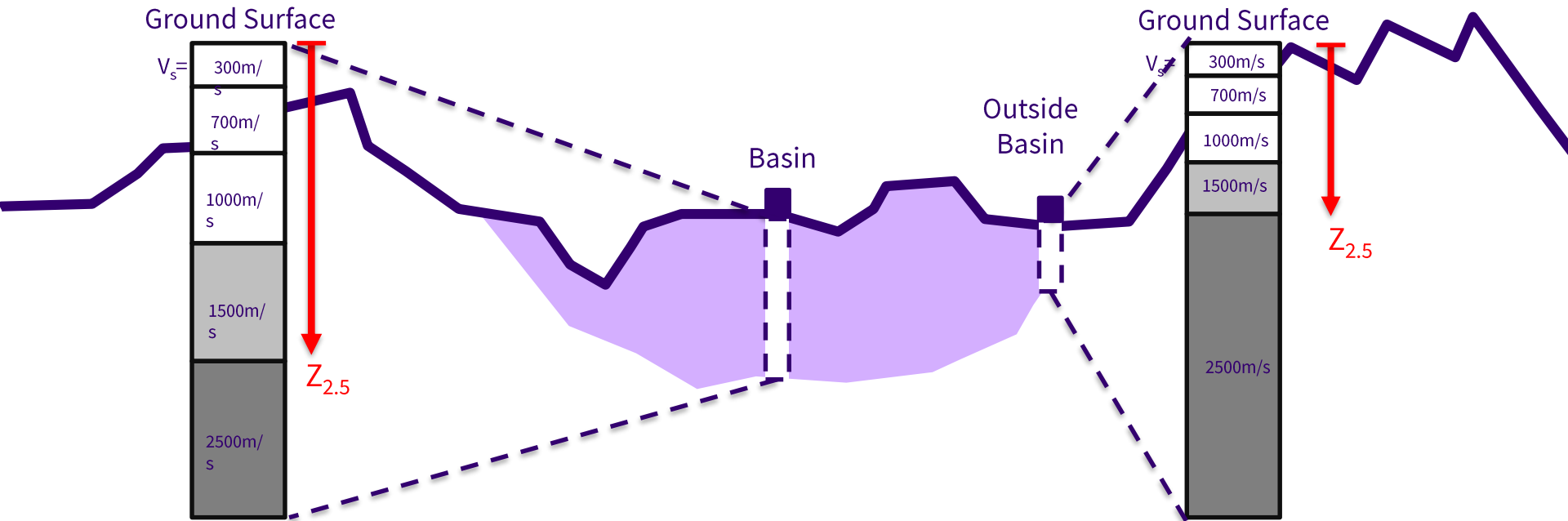


$\bar{S}_a(2.00s)$



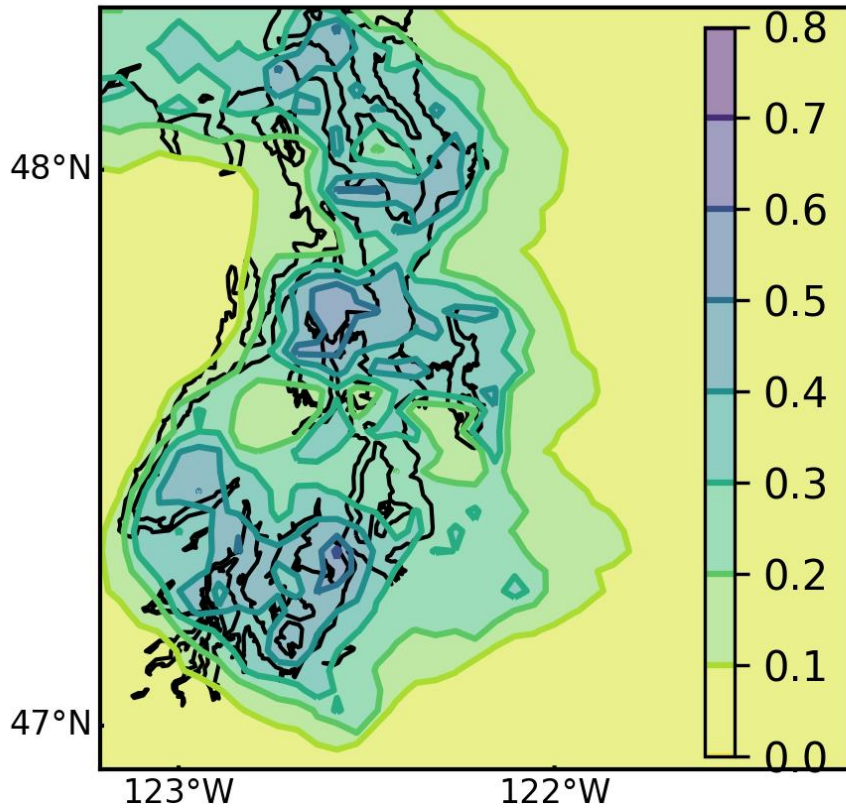
# $Z_{2.5}$ : A measure of Basin Depth

> Depth to sediment layer with  $V_s = 2500$  m/s

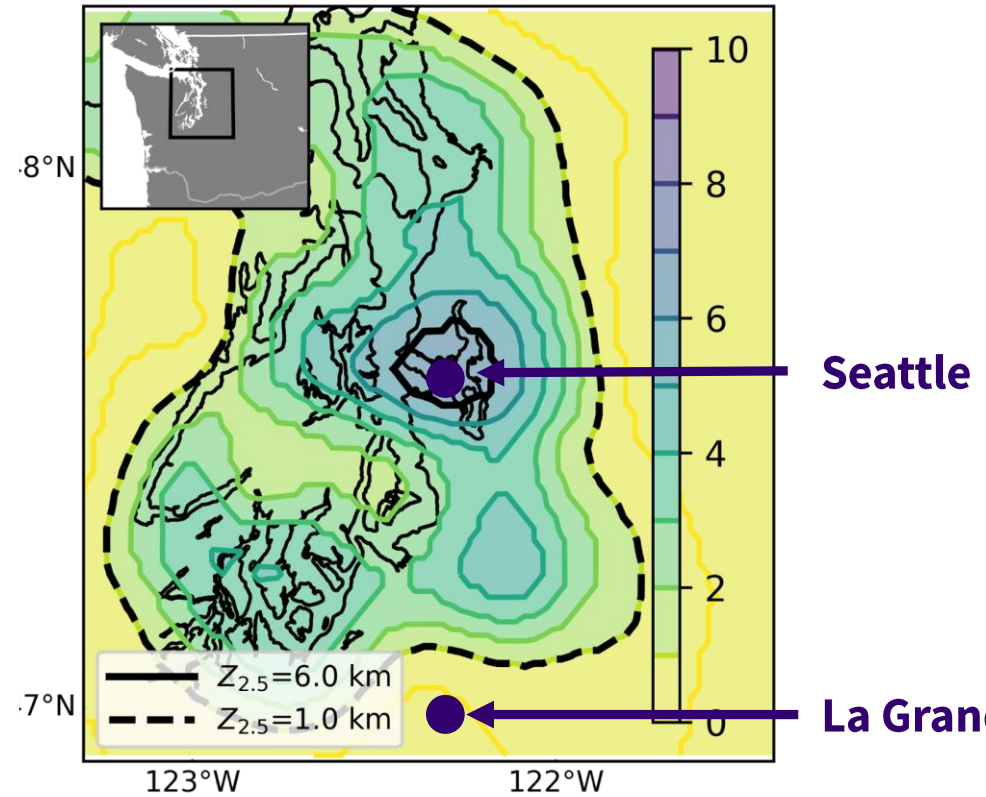


# Deep Sedimentary Basin

$\bar{S}_a(2.00s)$

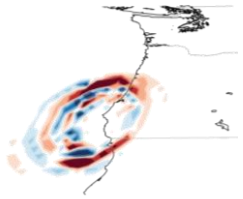


$Z_{2.5}, \text{ km}$



# Outline

USGS M9  
Simulations



Properties of  
Ground Motions



**Effects of 1D Site  
Amplification**

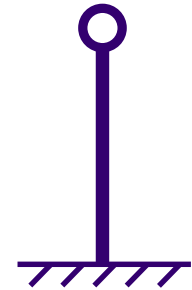
Surface



$V_s = 600$   
m/s

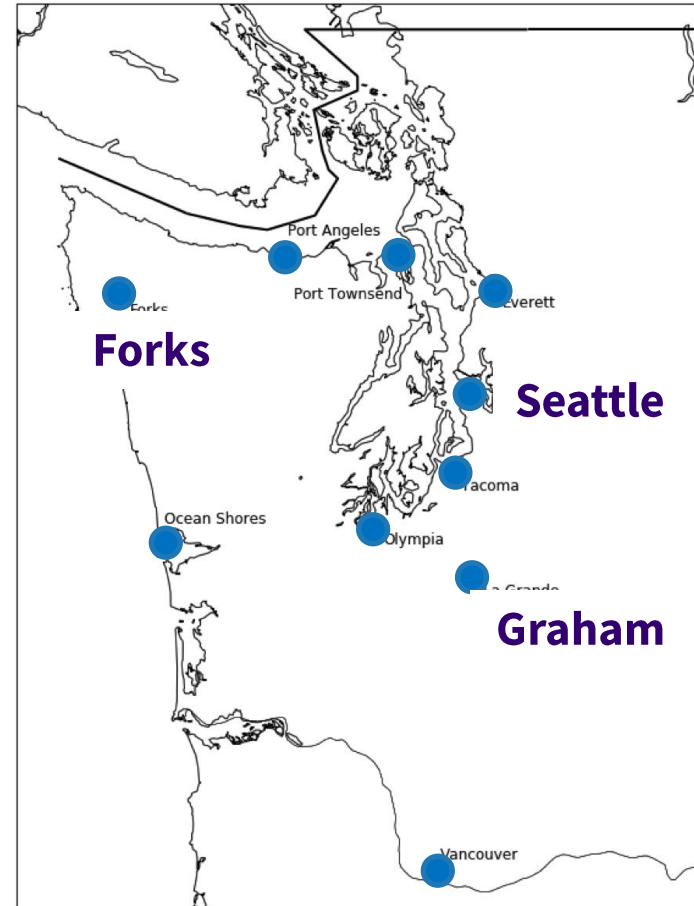


Performance of  
Idealized Bridges



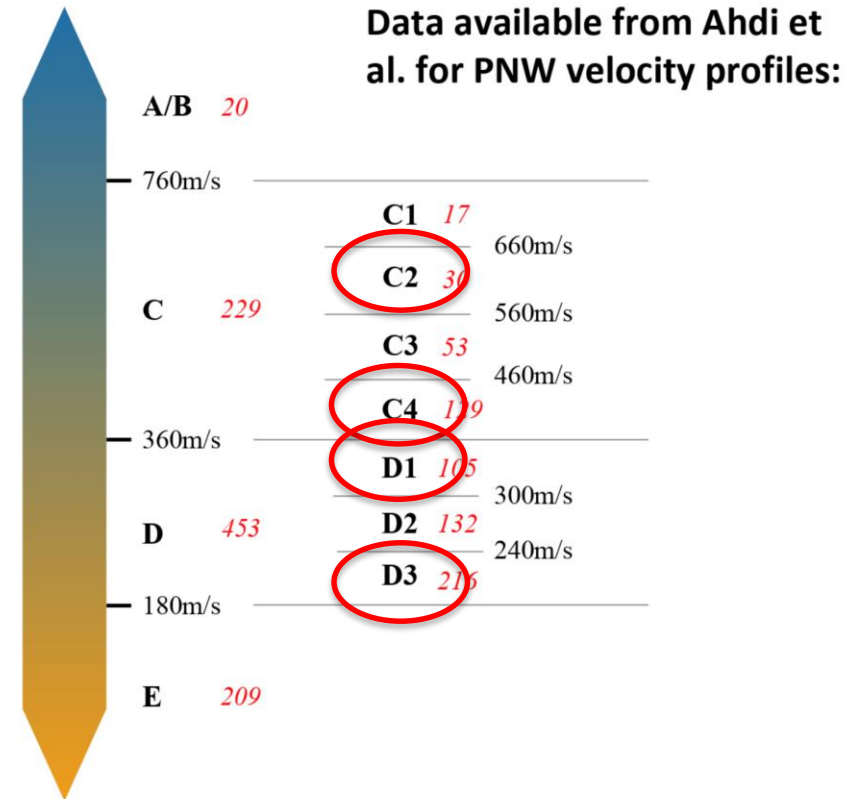
# 1D Site Amplification

- 30 Simulations
- E-W and N-S Directions
- 10 Locations



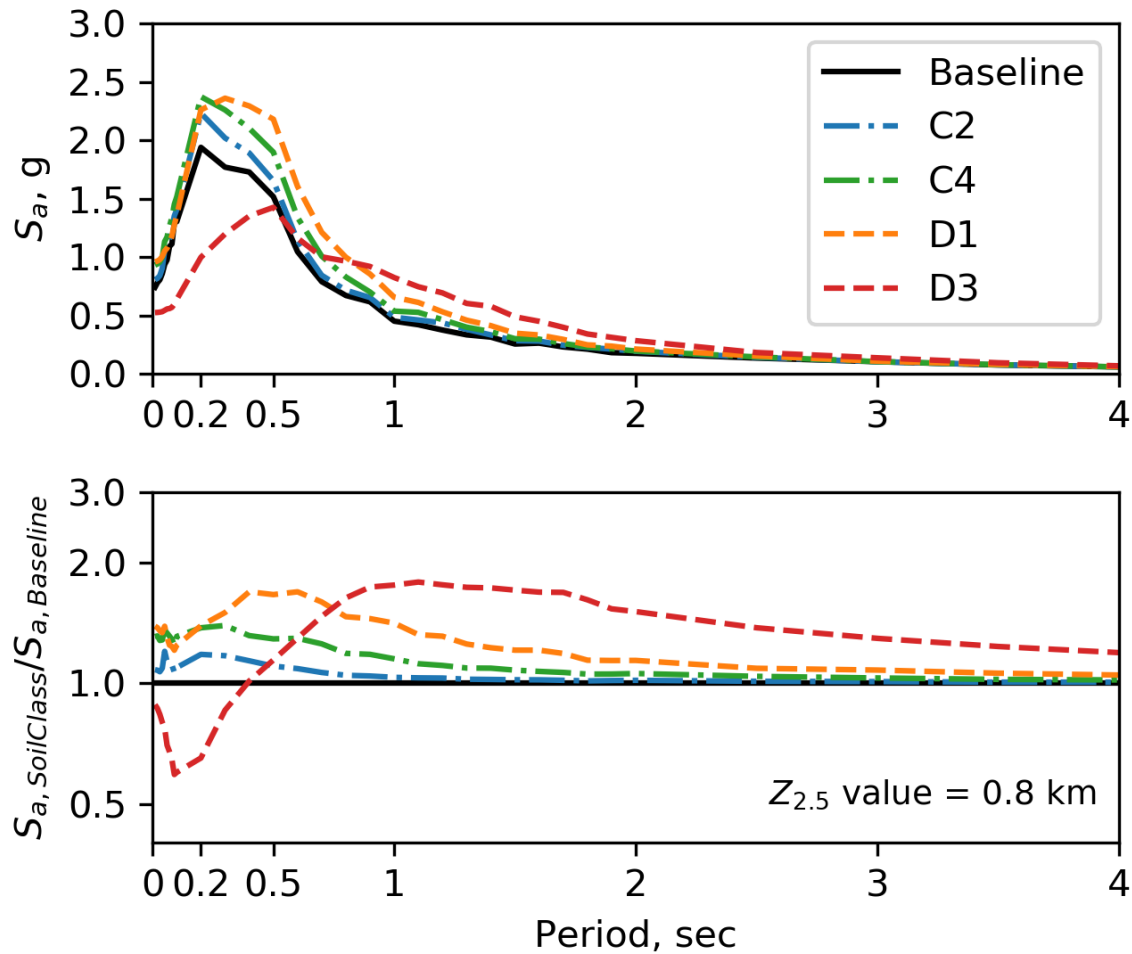
# 1D Site Amplification

- 30 Simulations
- E-W and N-S Directions
- 10 Locations
- Site Classes (C2, C4, D1, D3)
- 30 profiles per site class (Ahdi et al.)



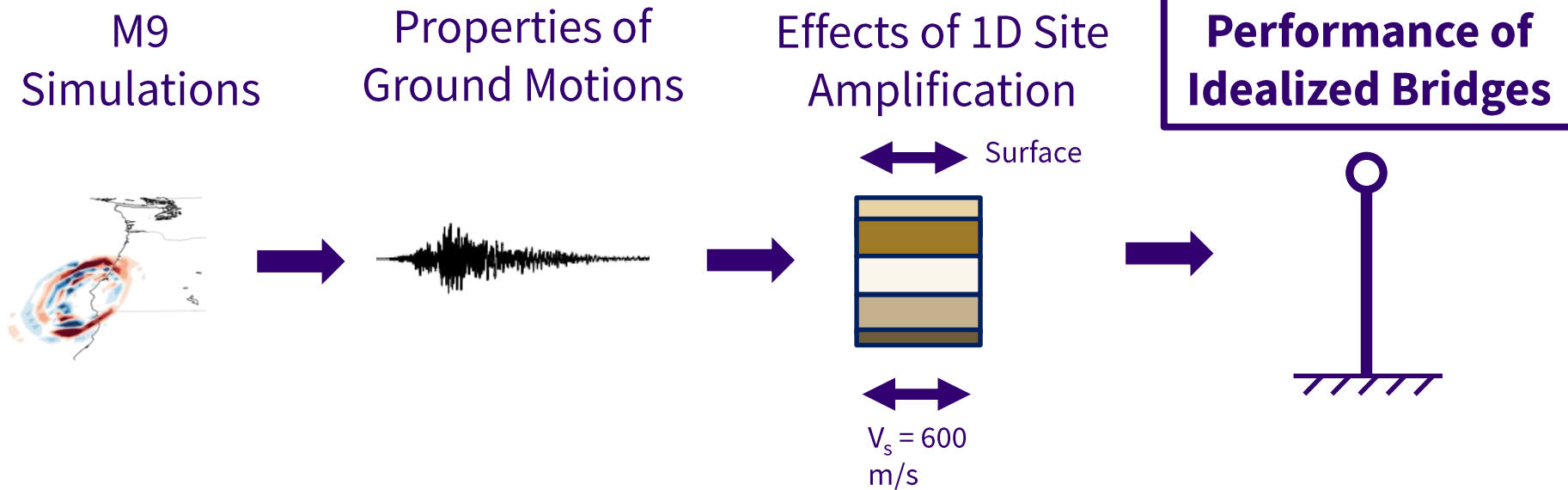
# 1D Site Amplification

## Forks



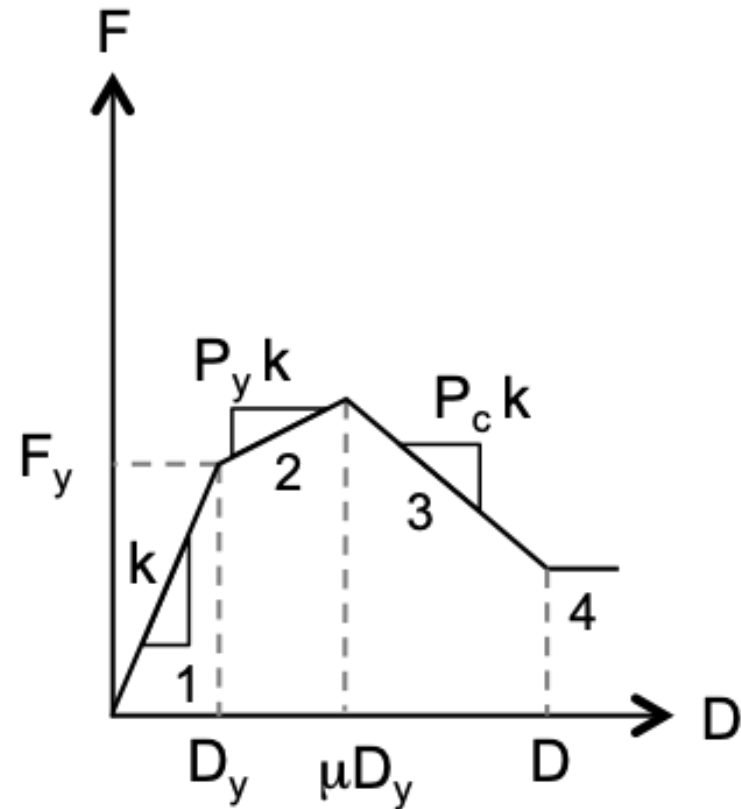


# Organization



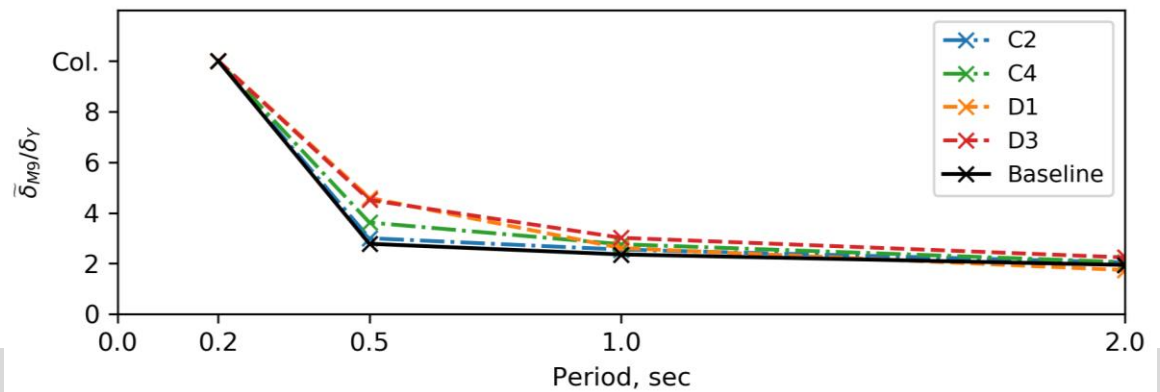
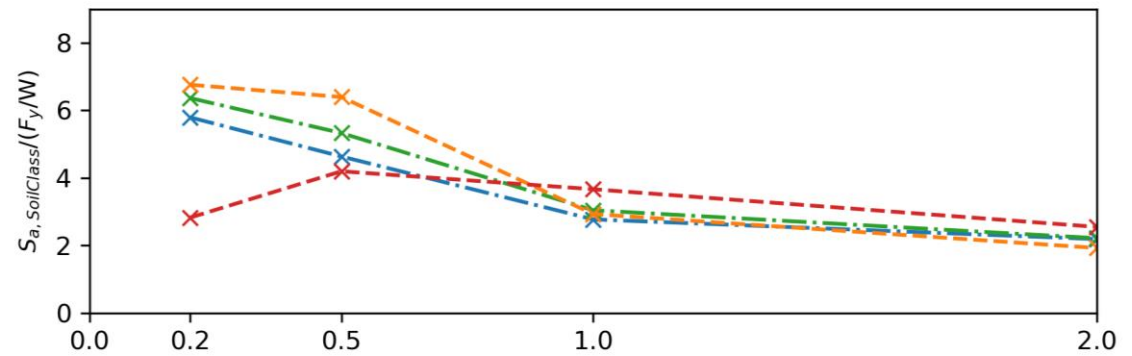
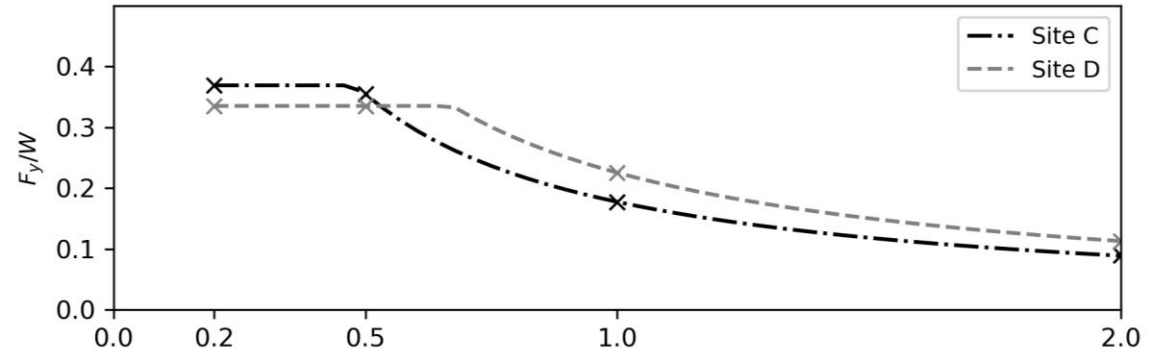
# SDOF Parametric Study

- SDOF Properties
  - WSDOT 17
  - Overstrength factor = 1.5
  - Displacement ductility = 5
- 4 periods
  - 0.2s, 0.5s, 1.0s, 2.0s
- 4 SDOF systems
  - Elastic
  - Elastic Perfectly-Plastic
  - Ibarra-Medina-Krawinkler (IMK) without cyclic deterioration
  - IMK with cyclic deterioration



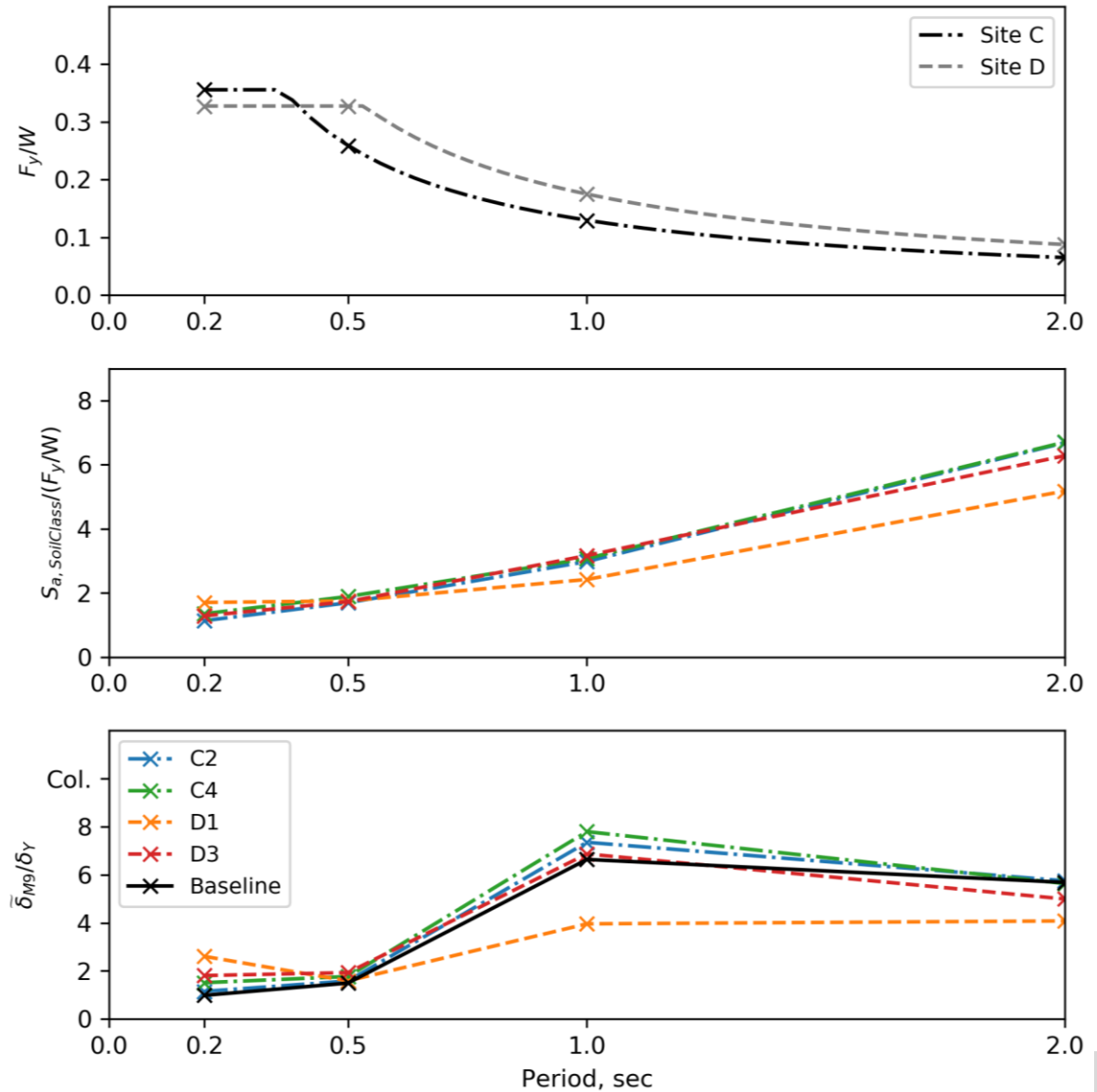
# SDOF Parametric Study

## Forks



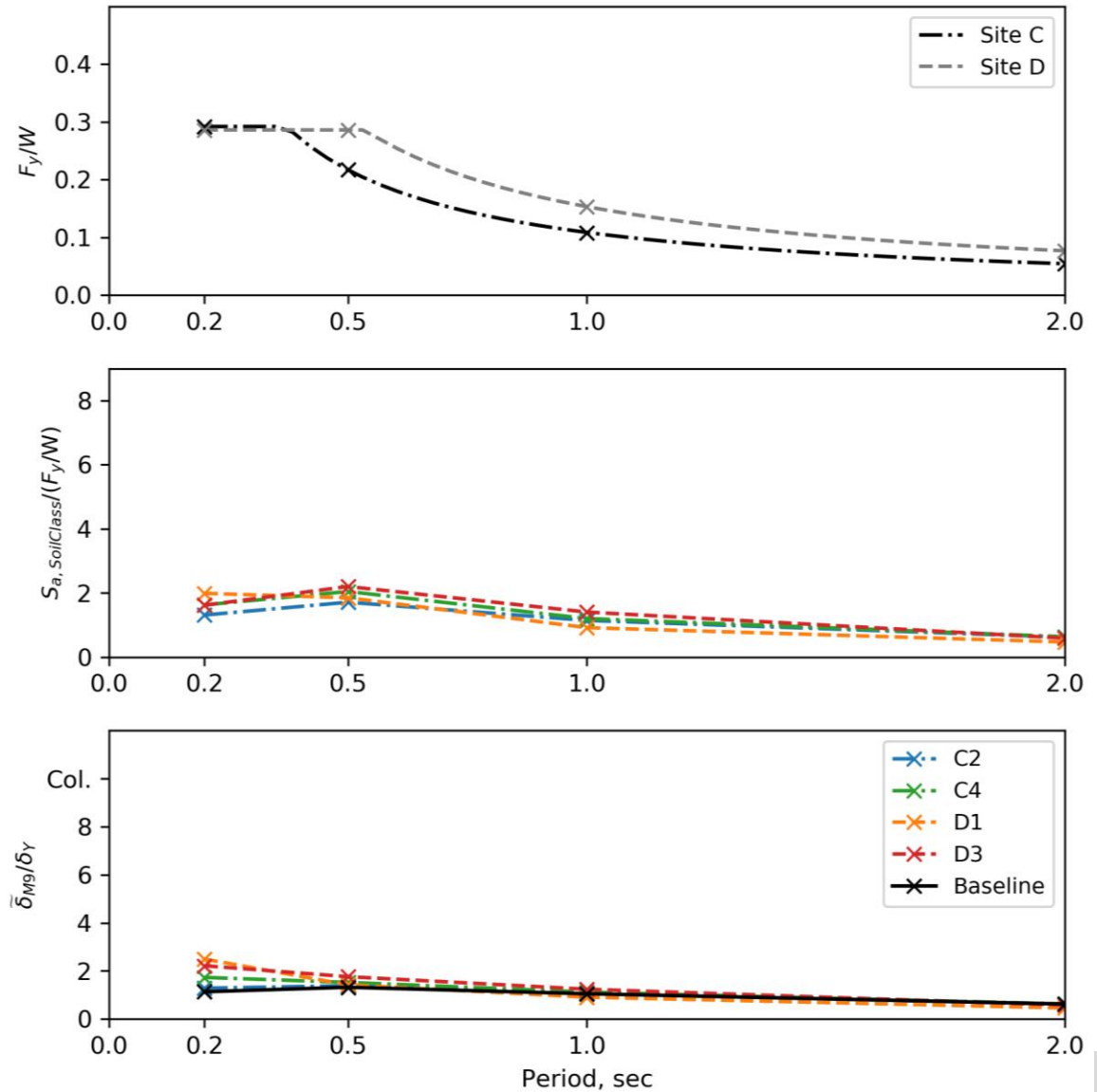
# SDOF Parametric Study

## Seattle



# SDOF Parametric Study

## Graham



# Conclusions

	Coast	Outside Basin	In Basin
Spectral Accelerations	High (as expected)	Low	Amplified (1s to 4s)
Spectral Shapes	Normal	Normal	More Damaging (0.5s to 3s)
Duration	Long	Long	Long
Expected Damage to New Bridges	High (Very Short $T_n$ ) Moderate (Mod. Or Long $T_n$ )	Low	High (Long $T_n$ ) Low (Short $T_n$ )

# Some Big Remaining Issues

- Discrepancies with RRAP Resiliency Assessment (2019)
- Extent of Liquefaction within Basin
- Impacts of Utility Lifelines?
- Consequences for Emergency Management Community (e.g., Selection of response lifelines)

**Thank You**





# Statewide Catastrophic Incident Planning Team (SCIPT)

**6 November 2019, 1:00 – 4:00 PM**

**Camp Murray - Building 20 SEOC**

## Meeting Notes

- **New BSST/HSST contact will be Dan Banks, Emergency Preparedness Planner**
  - Desk: (360) 705-7153
  - Cell: (360) 489-5868
  - Brittney Miller's last day at WSDOT is 11/07/2019.
    -
- **Fuel Planning Update**
  - Eli has been working on the State's Fuel Action Plan.
    - Has visited almost all of the Washington Homeland Security Regions
    - Did a presentation at the Washington State Emergency management Association Annual Conference in September.
  - The Washington State Fuel Needs Assessment Tool is available for agencies to add in their information
  - She is in the process of the first draft to identify fuel depots
    - Asking about security on structures
  - GridEx V Scheduled for Nov 13<sup>th</sup>.
  - Next steps in Fuel Planning Workgroup will be:
    - State waivers implementation
    - Local fuel planning guide
    - Discussion on emergency fuel contracts
  - FEMA has a Fuel Supply Chain Technical Assistance Program and they are willing to expand the cohort in Washington if your jurisdiction is interested in participating please let Eli know.
- **BSST Update**
  - <https://wsdot.maps.arcgis.com/home/webmap/viewer.html?useExisting=1&layers=8196b518702343ef82fec575f9581b2a>
  - The BSST/HSST tool has the definitions of the severity of damage within the tool.
  - Dan will be sending the HSST to Jim Buck so Clallam County can begin the process of adding the HSST to the GIS tool they developed.
- **Washington State Catastrophic Incident Planning Update**
  - The Catastrophic Incident Annex has been modified in format only to align more closely with CPG 101 and the Washington State CEMP.
  - The change is to align with Core Capabilities.
    - Mortuary Services was moved to under Fatality Management
    - Utilities Restoration was changed to Infrastructure Systems
      - Water and Waste Water were separated

- **Logistics – Gap Identification and Analysis**
  - Currently working on Beach Head Locations
    - Doing Site surveys
      - Awaiting Clallam, Jefferson, Grace Harbor and Pacific Counties data.
      - Jim Buck gave signed letter from Sheriff to Robert and said he can get a copy to Mark as well.
  - RCPGP will help identify CPODs based on Jurisdictions
- **RRAP Updates**
  - Transportation
    - Nothing new to add
  - Water Systems in Western & Central Washington
    - Potential Outcomes
      - Determination of potentially viable post-CSZ water sources
      - Data sets that “type” surface, ground, and finished water sources based on post-CSZ viability and accessibility
      - Development of post-CSZ planning factors
      - Identification of optimal areas/zones for Points of Distribution
  - Airport Survivability
    - 20 Airports in Priority List
      - Doing 10 surveys ~ 4 hours long each
      - 09DEC2019
        - WR Fairchild
        - Bremerton
        - Sanderson Field
        - Olympia
- **RCPGP update**
  - Oct 23<sup>rd</sup> Kickoff
  - Reviewed Grant Application
  - Transportation RRAP
  - Grant
    - Viable Goal
      - Released today
        - Engage Private sector maritime community
  - Kristen, Project manager RCPGP Grant: (425)388-3879
    - Goal is to tell the community where they will go to get their resources
    - Focusing on the final mile
    - Working with a contractor
      - Data
        - Gather
        - Analysis
          - Where to place CPODs
      - Focusing on 8 county region of Puget Sound + 7 cities who wrote support letters
      - Need a good operational plan so it can be replicated beyond this region

- Focusing on how to extend the budget to make it last beyond the three year mark.
  - RSP Contractor
    - Trying to get to contract by January 2020
- **M9 Presentation**
  - Big Takeaways
    - M9 and RRAP scientists will be having a meeting in the next couple of weeks to discuss variations in the study results and review the planning assumptions that led to those results.
      - They may post an update based on the results of both studies.
        - Many participants expressed interest in learning the outcome of the meeting.

**Please take the Survey Monkey Poll to decide the next meeting.**

<https://www.surveymonkey.com/r/25J5TGY>

**Poll is now closed.**