THE UNIVERSITY OF BRITISH COLUMBIA

Regional Seismic Risk for Dense Urban Centers in Vancouver

GIS Day
November 16, 2022

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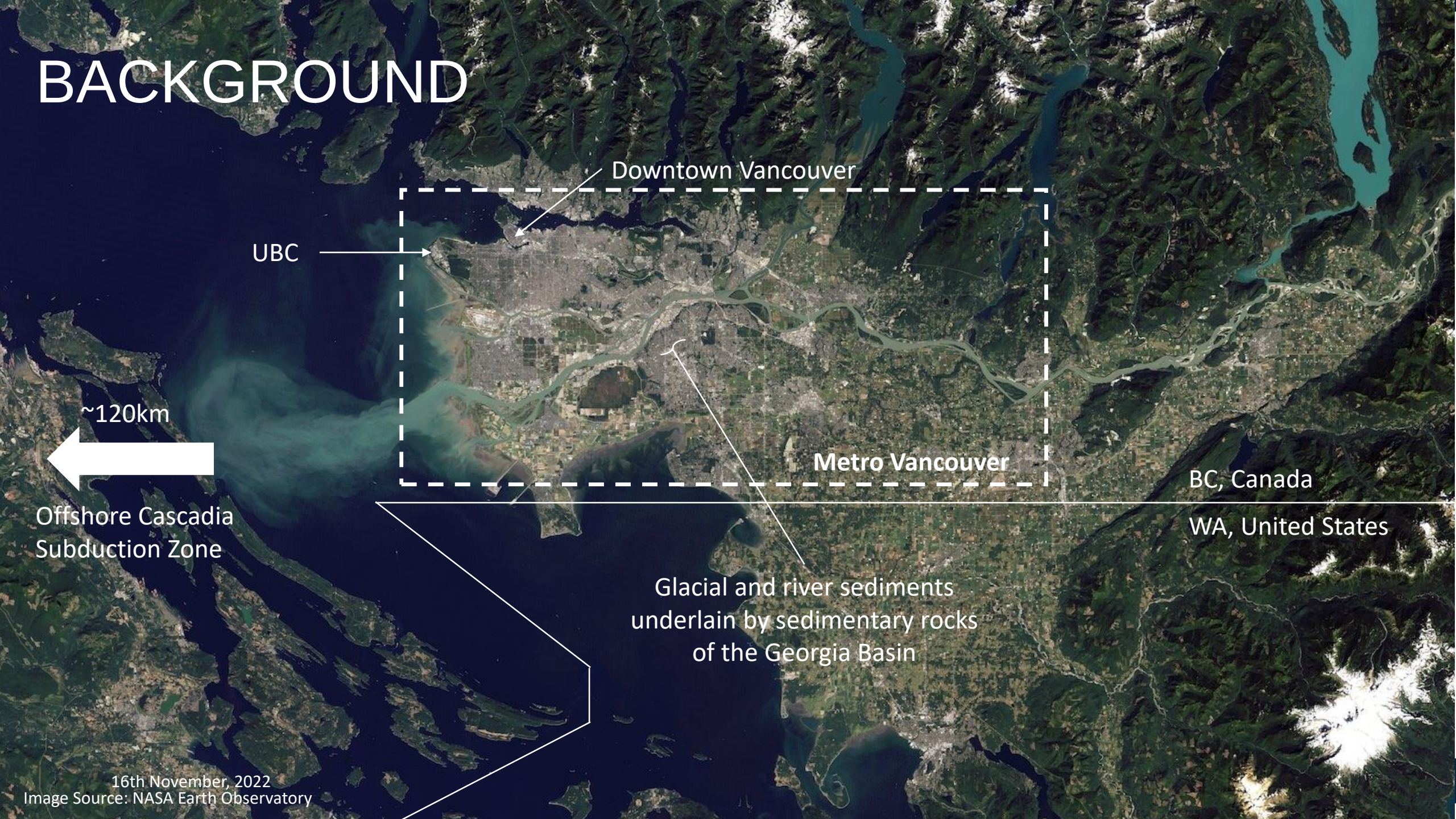
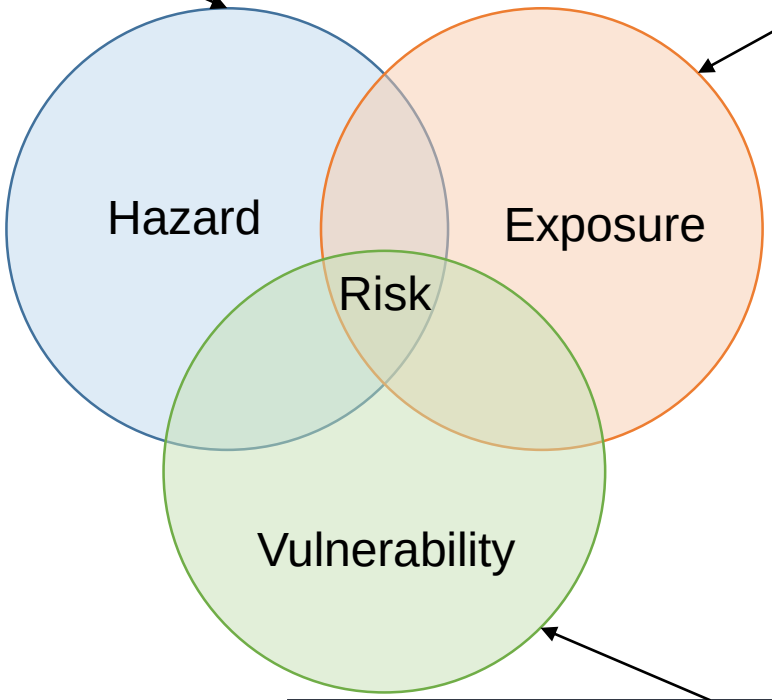
BACKGROUND



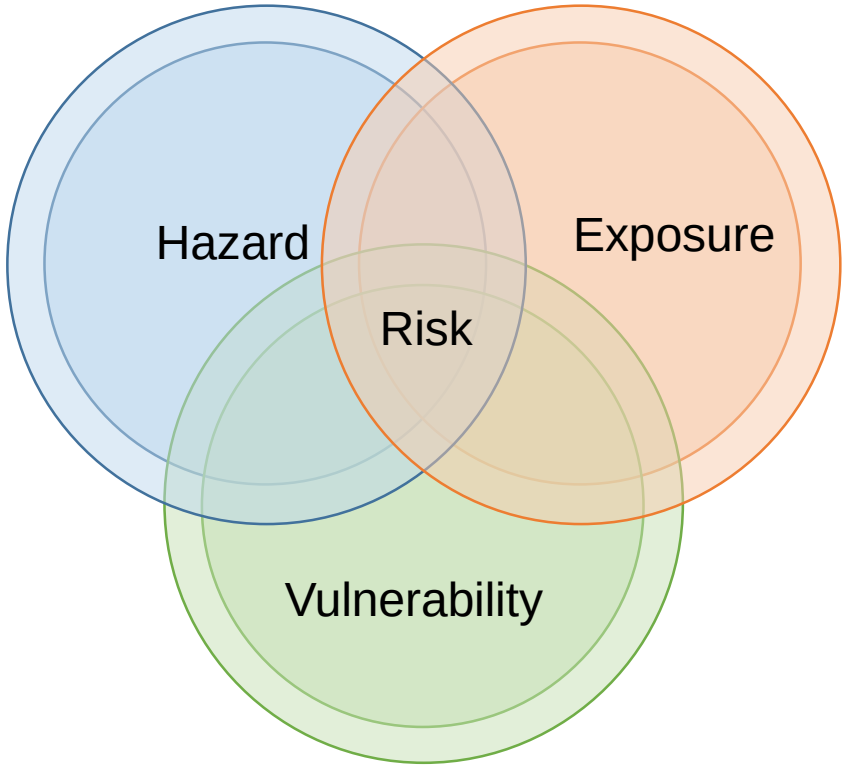
16th November, 2022
Image Source: NASA Earth Observatory

Probability of a potentially damaging effect occurring at site(s) of interest

People or Assets exposed to a hazard

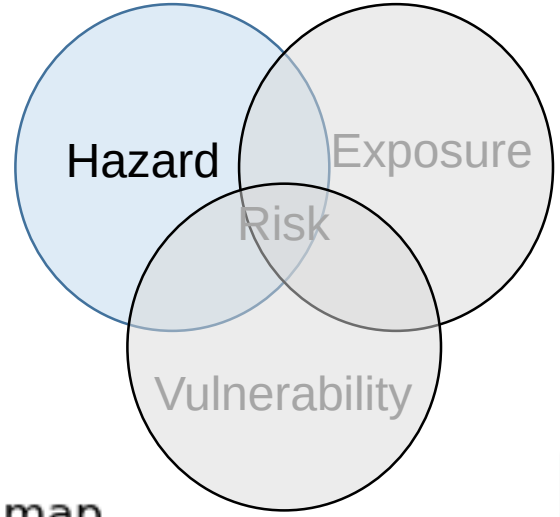


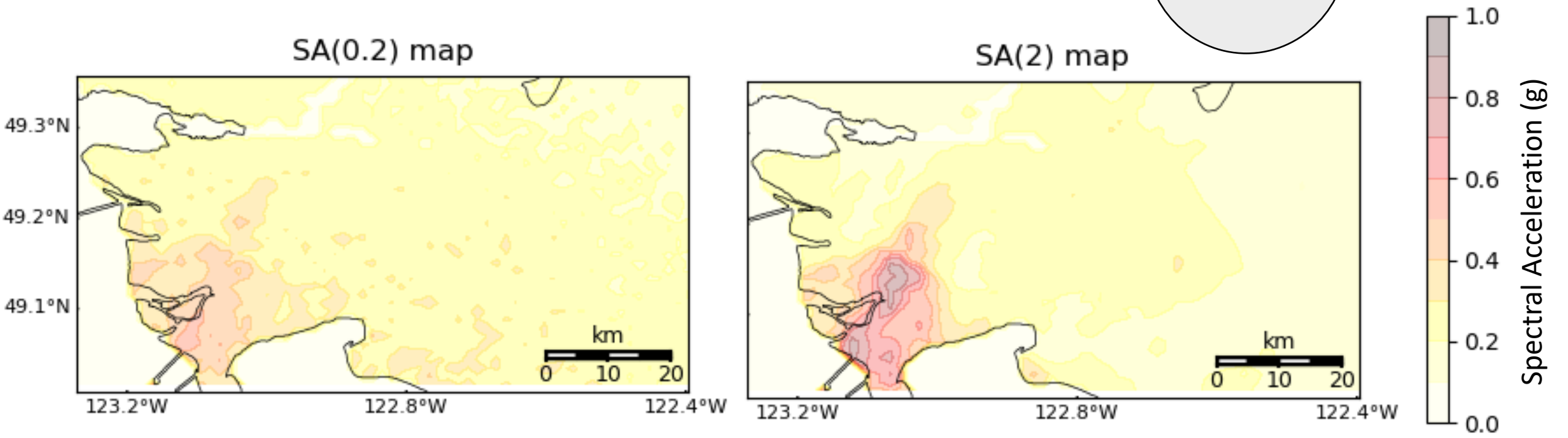
Probability of damage or loss in an asset when exposed to a particular effect.



Time

Seismic Hazard Maps





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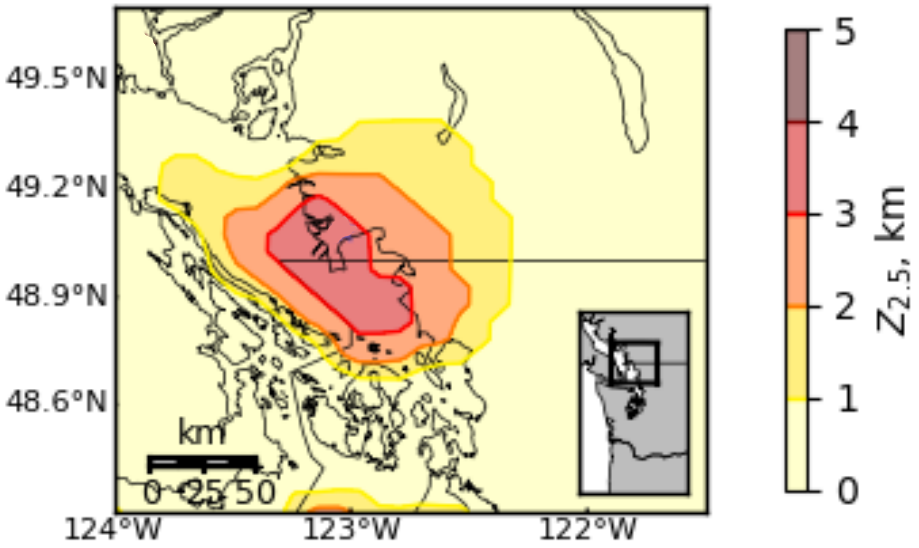
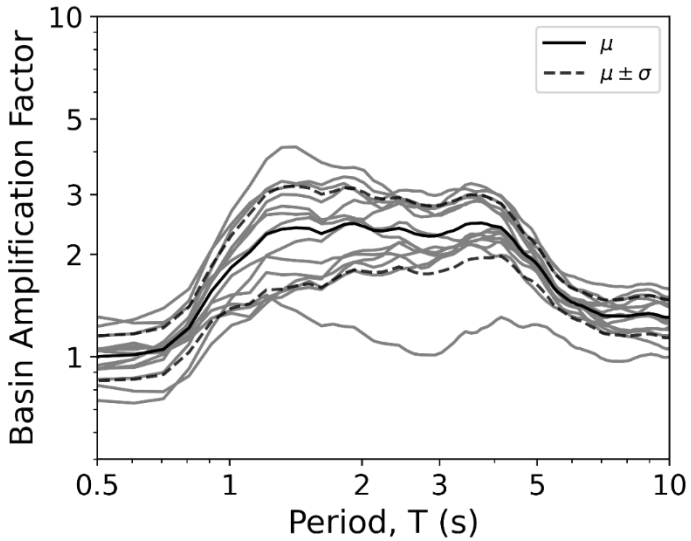
Seismic Hazard Maps

- Basin amplification factors (BAF) are developed with respect to reference sites in the basin edge and outside of basin
  - Maximum BAF of **5.69** and **2.74** at a 1.61s period

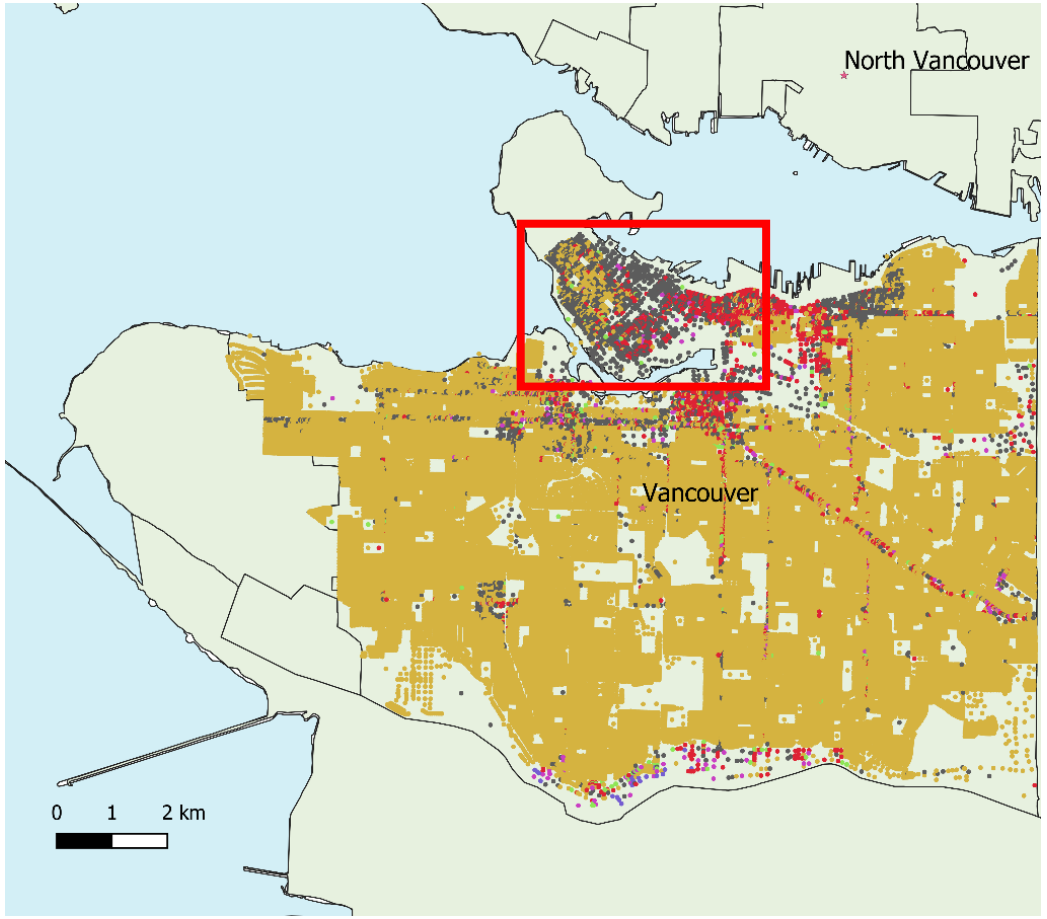




Vancouver’s Building Exposure

Building Material

- Wood (94.39%)
- Concrete (2.96%)
- Steel (0.27%)
- Reinforced Masonry (0.22%)
- Unreinforced Masonry (2.13%)
- Precast Concrete (0.03%)



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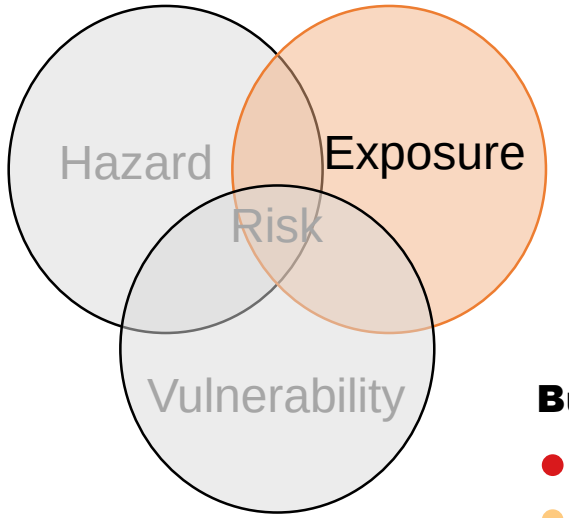
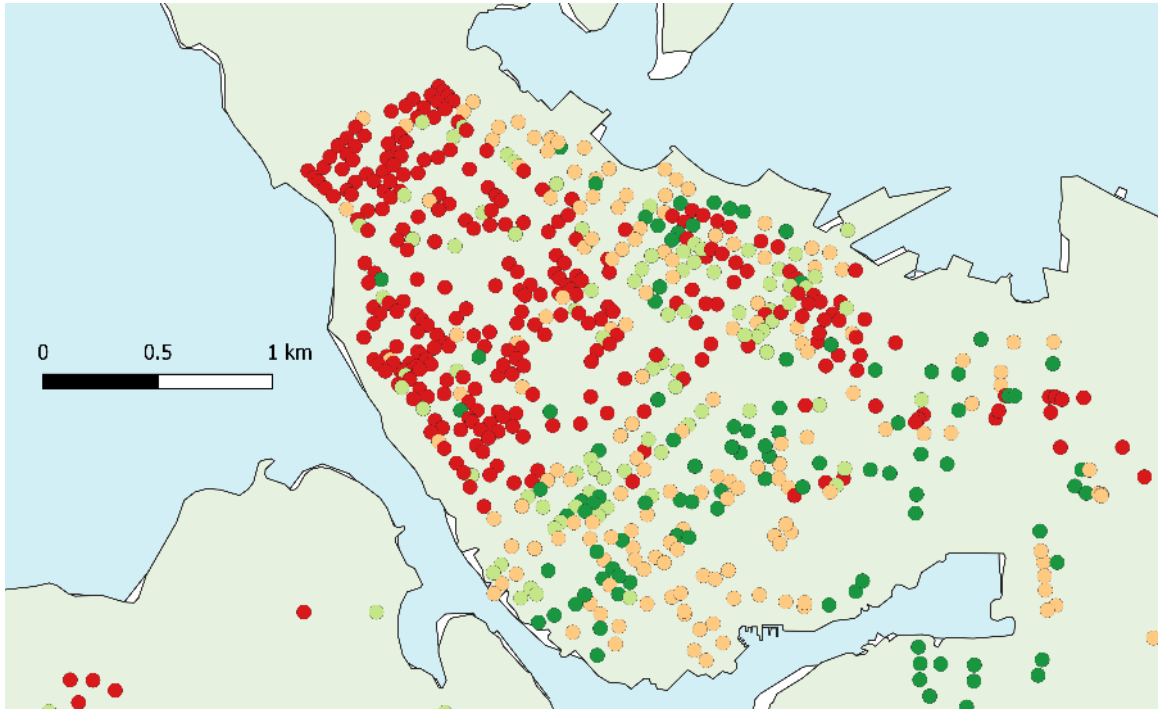
Vancouver's Building Exposure



Building Code Era

- Pre-Code (< 1975)
- Low Code (1975 – 1990)
- Moderate Code (1990 – 2005)
- High Code (>2005)



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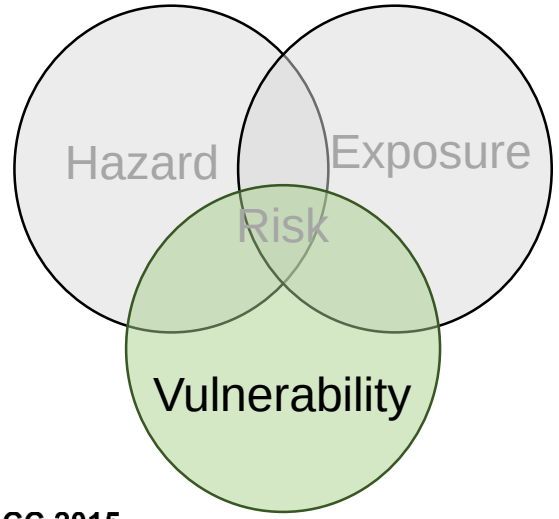
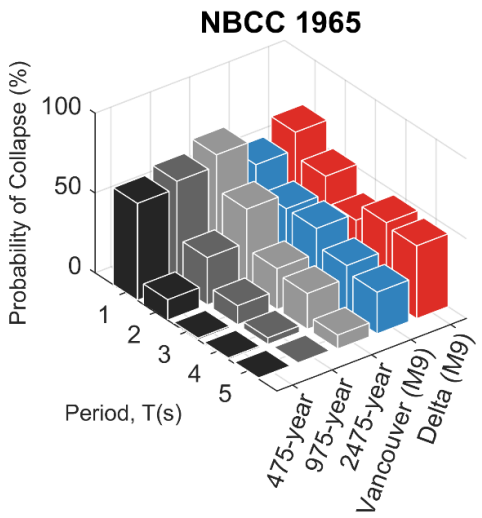
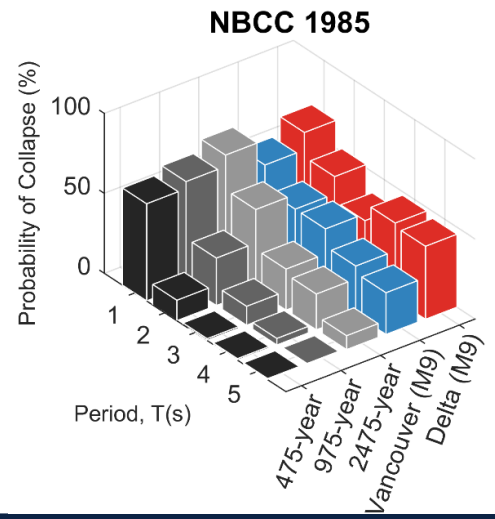
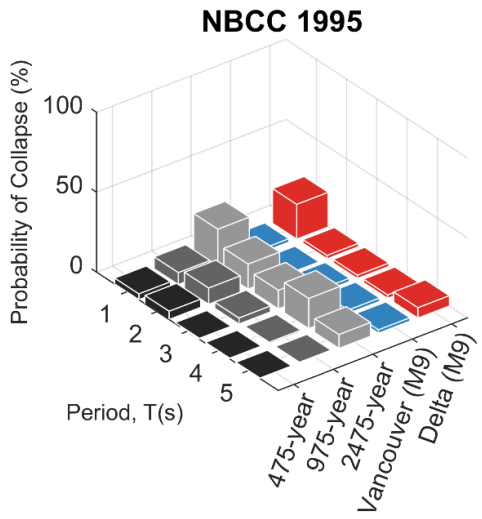
Structural Vulnerability of Buildings

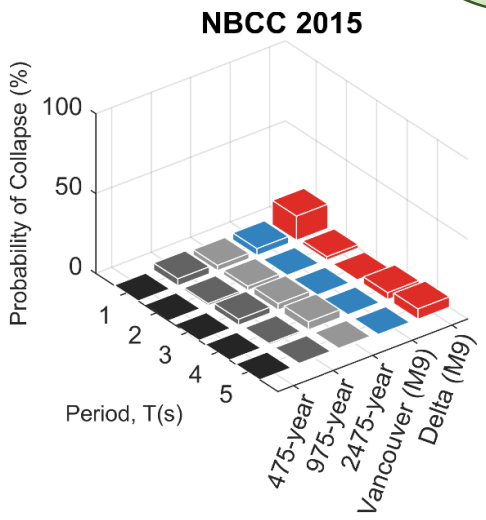
- 91% of tall buildings are RCSW; predominantly 10-30 stories
- Probability of Collapse per building code year
  - NBCC 1965 – 60.87%
  - NBCC 1985 – 52.73%
  - NBCC 1995 – 8.07%
  - NBCC 2015 – 6.83%











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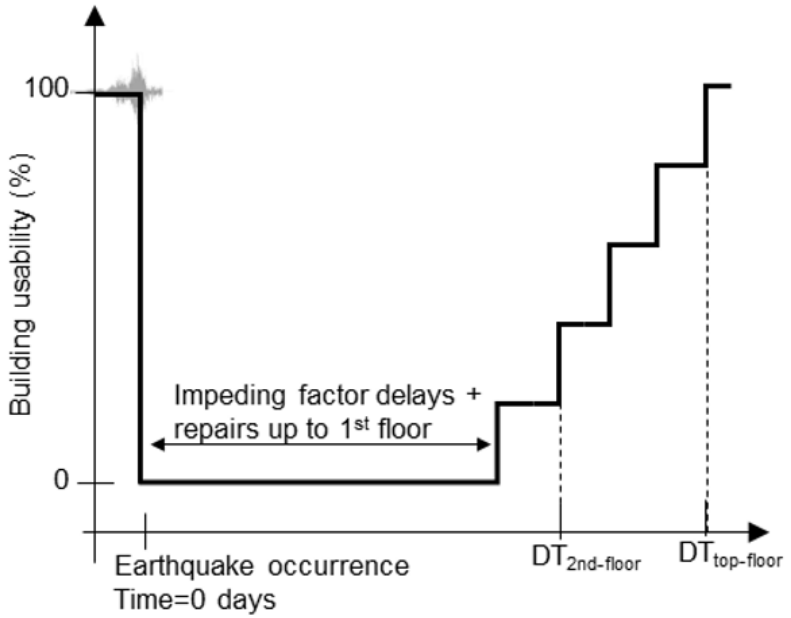
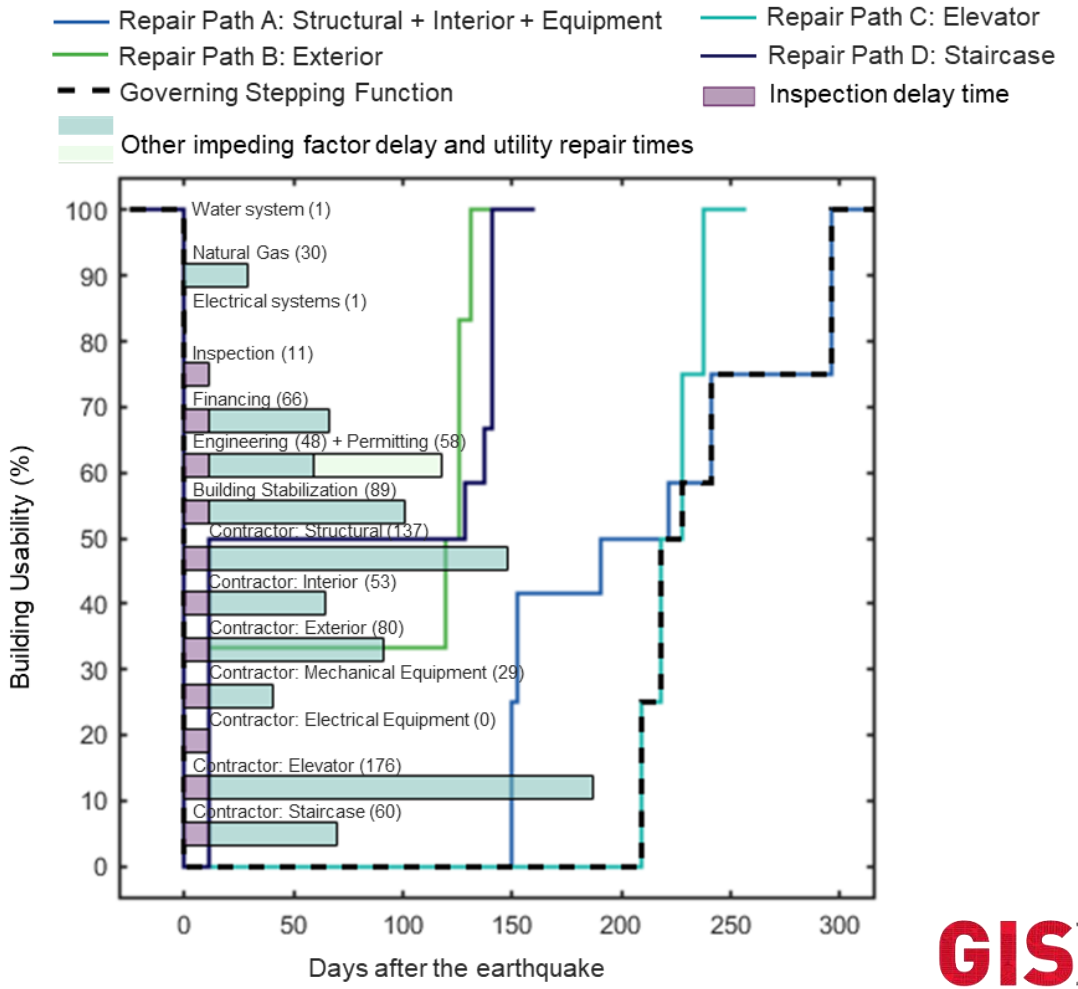
Structural Vulnerability of Buildings

- Methods to quantify post-earthquake housing recovery





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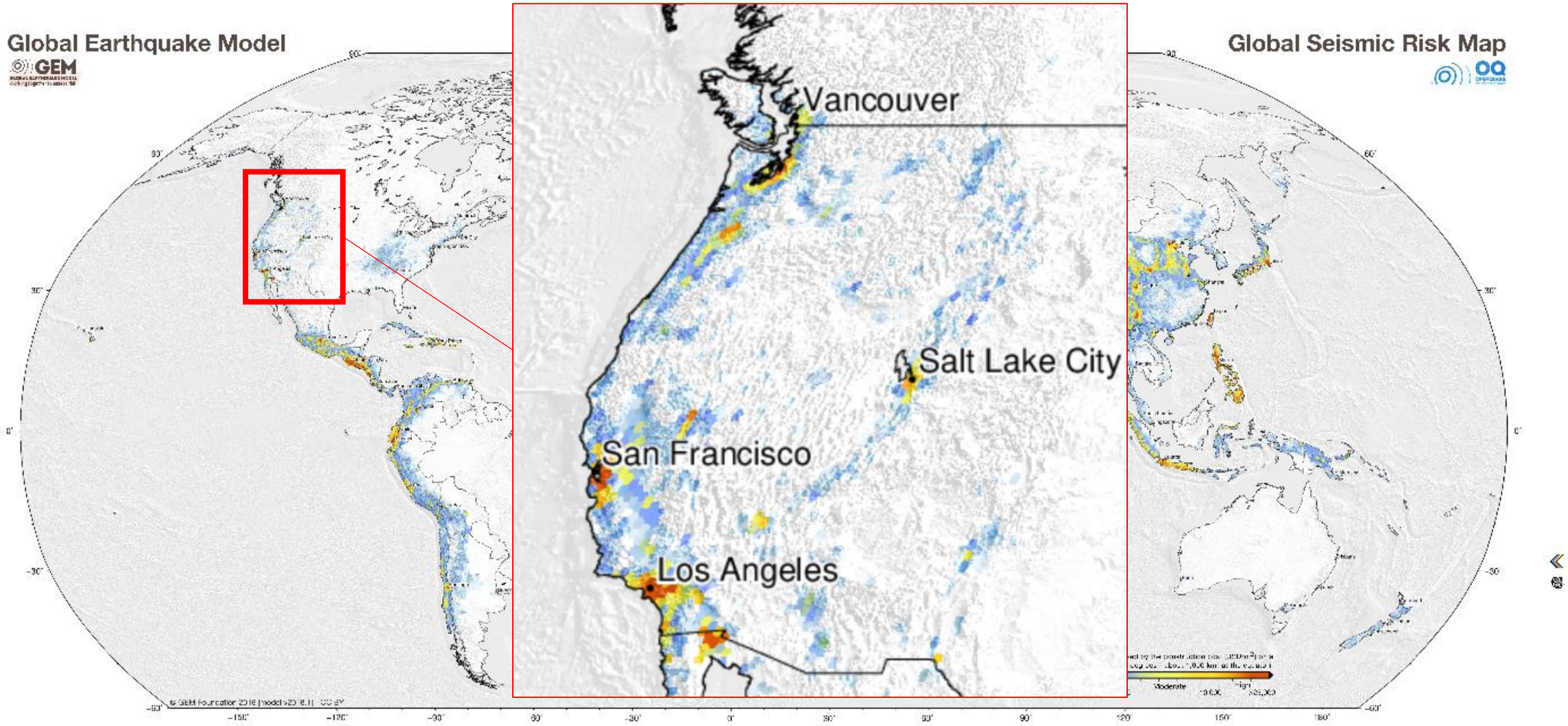
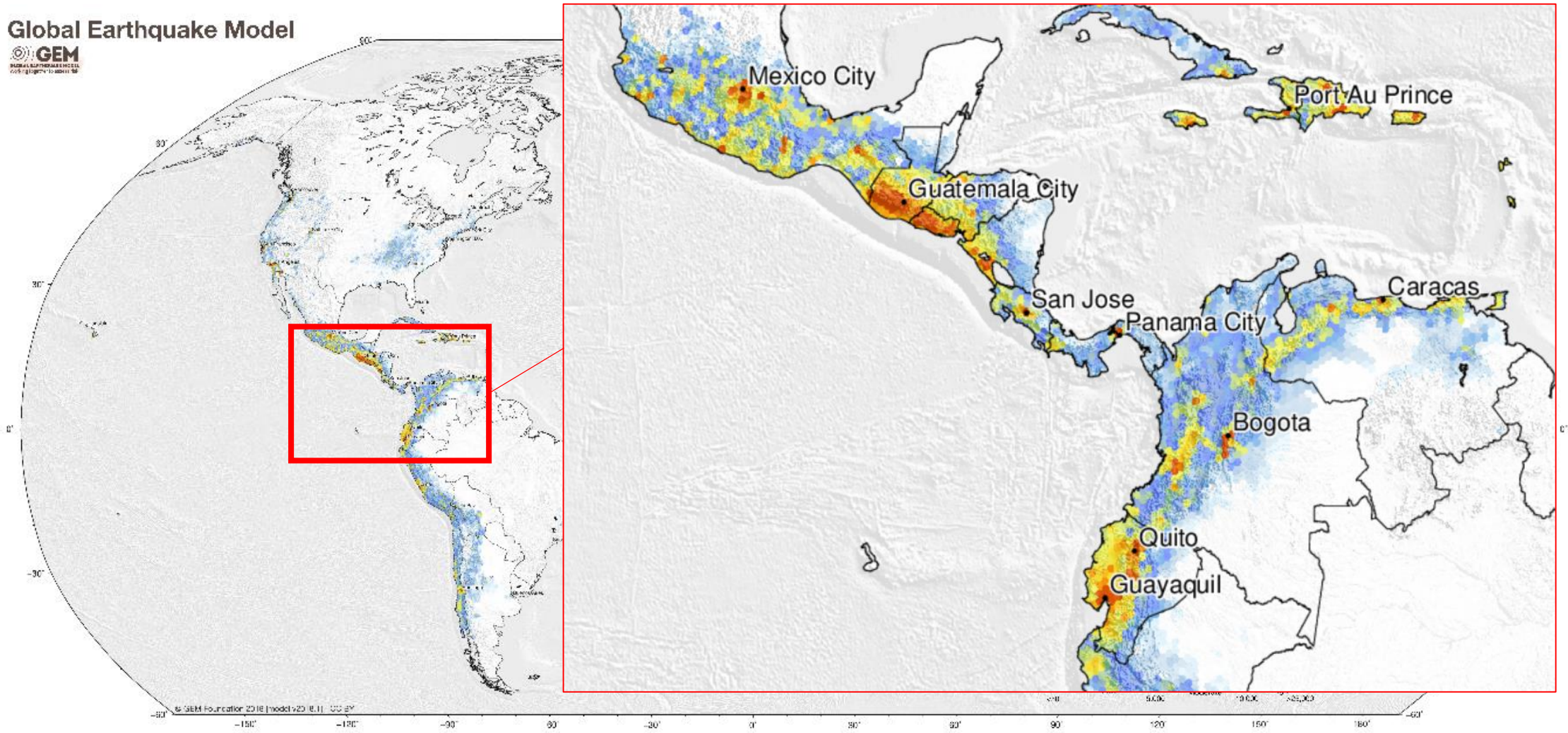


Source: Global Earthquake Model (GEM)



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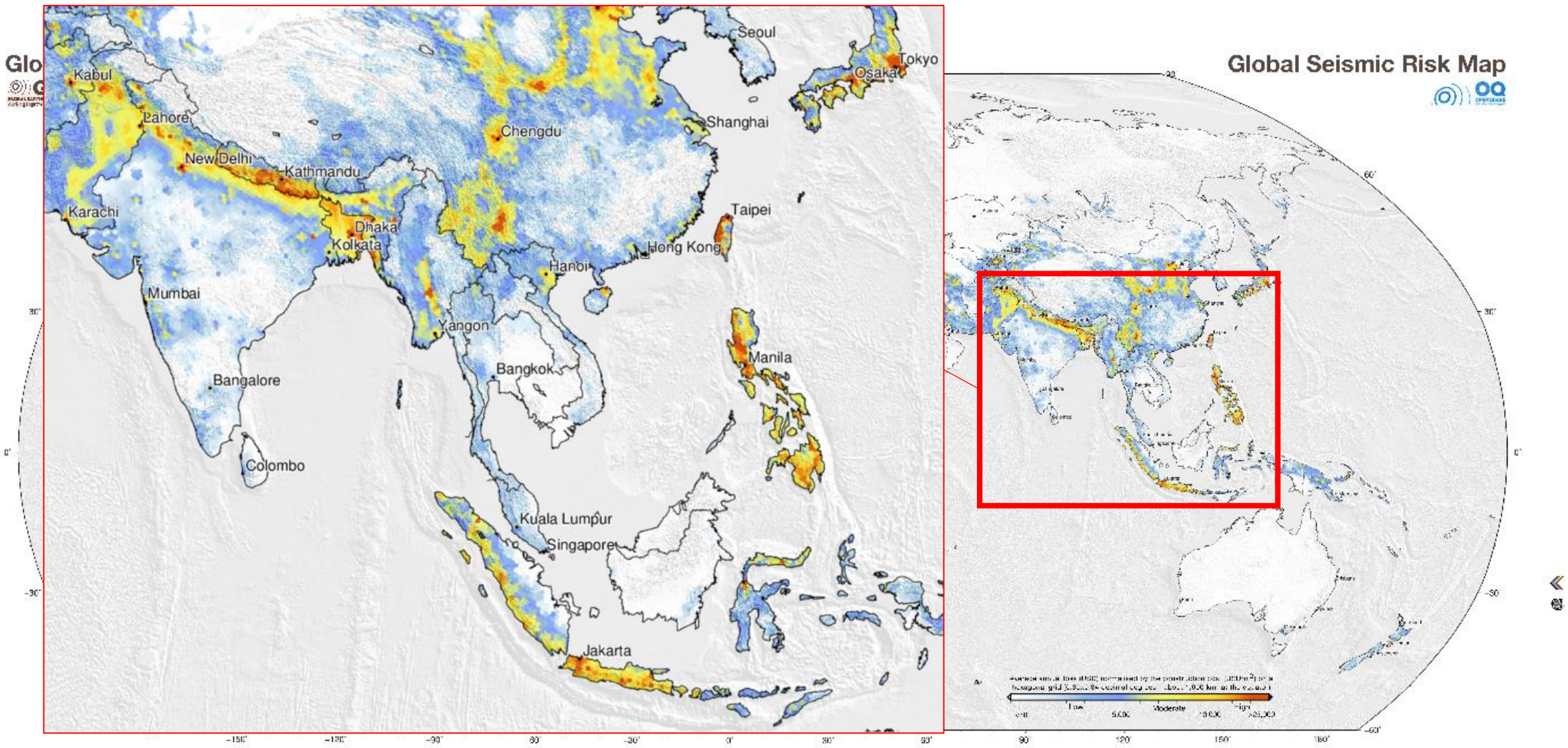

Source: Global Earthquake Model (GEM)

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Thank You!

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