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Geological Survey of Canada Scientific Presentation 132

Seismic risk in the National Capital Region, Ontario

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2022

Canada

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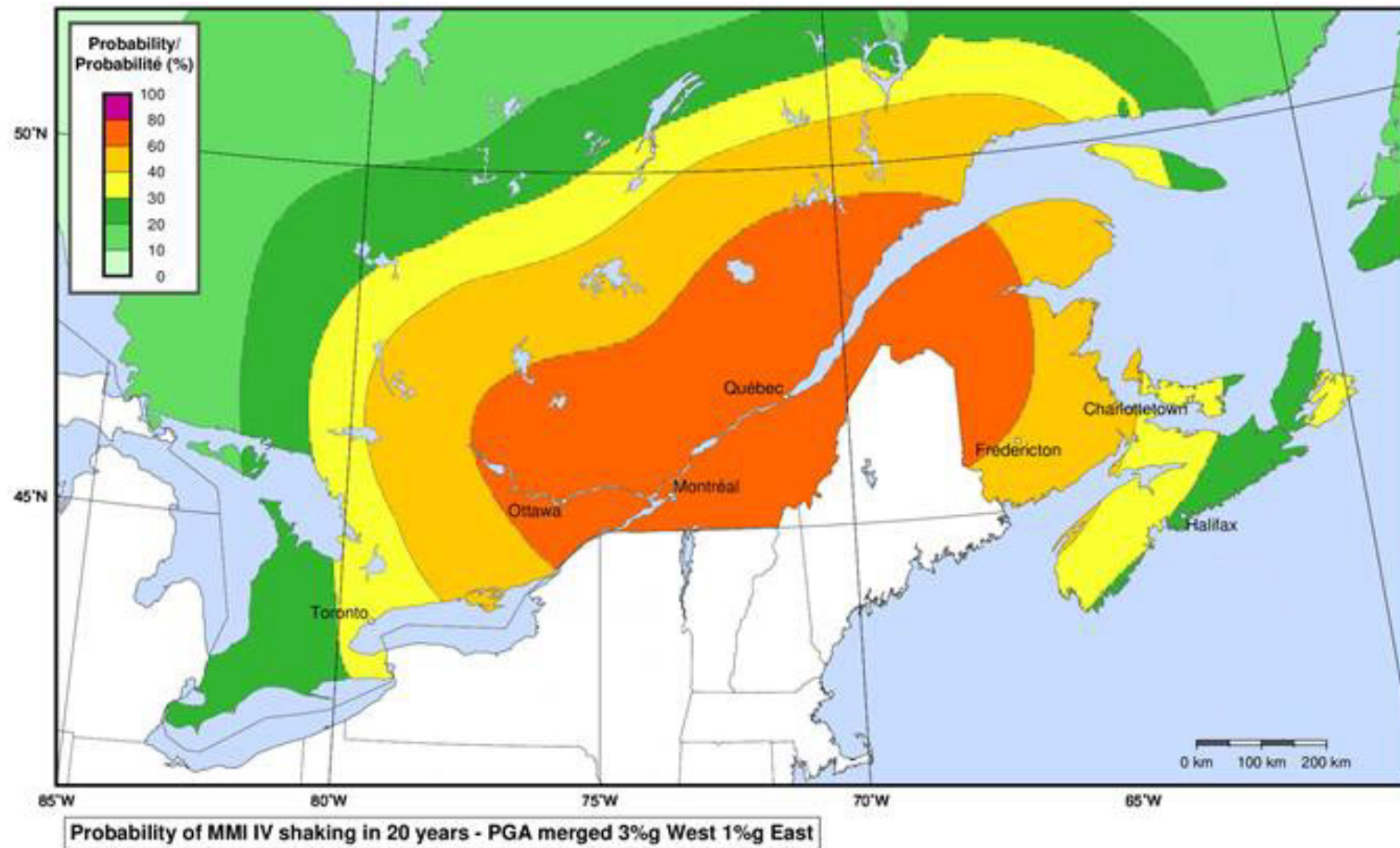


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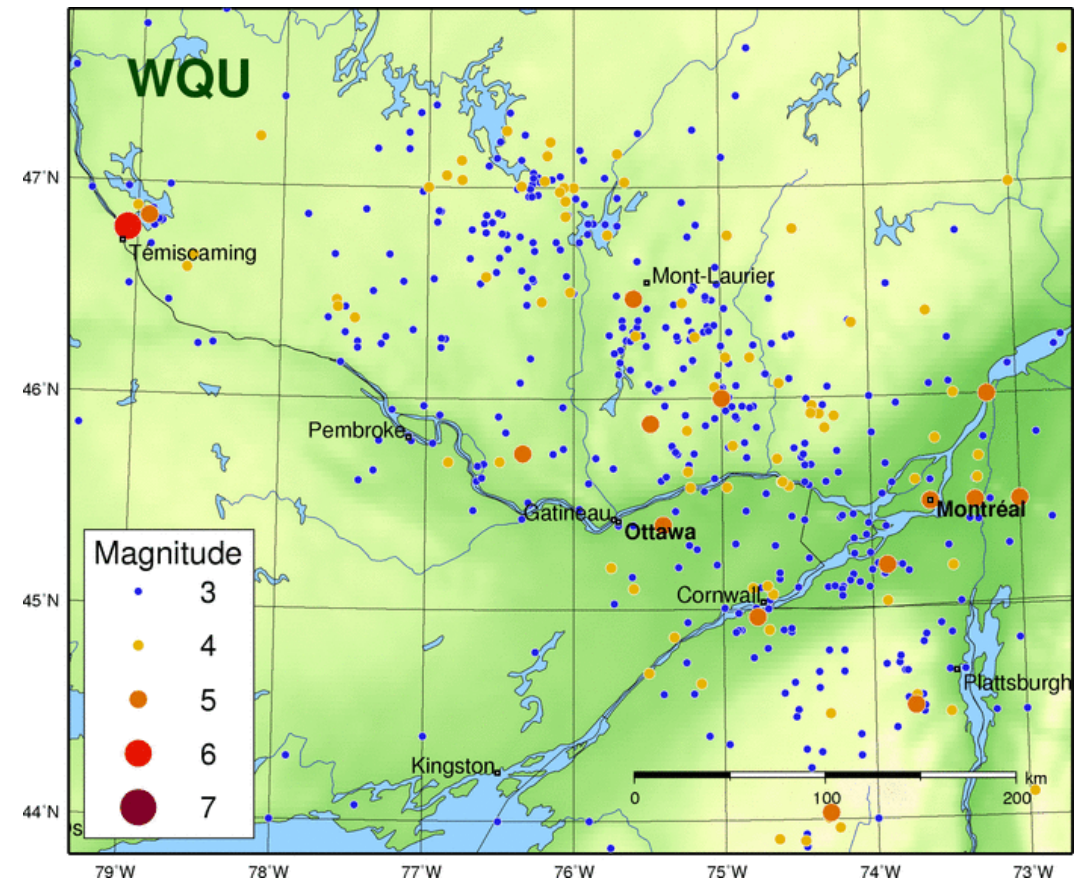
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What Causes Earthquakes in Ontario?



What Causes Earthquakes in Ontario?

- Generally earthquakes occur near the edges of tectonic plates

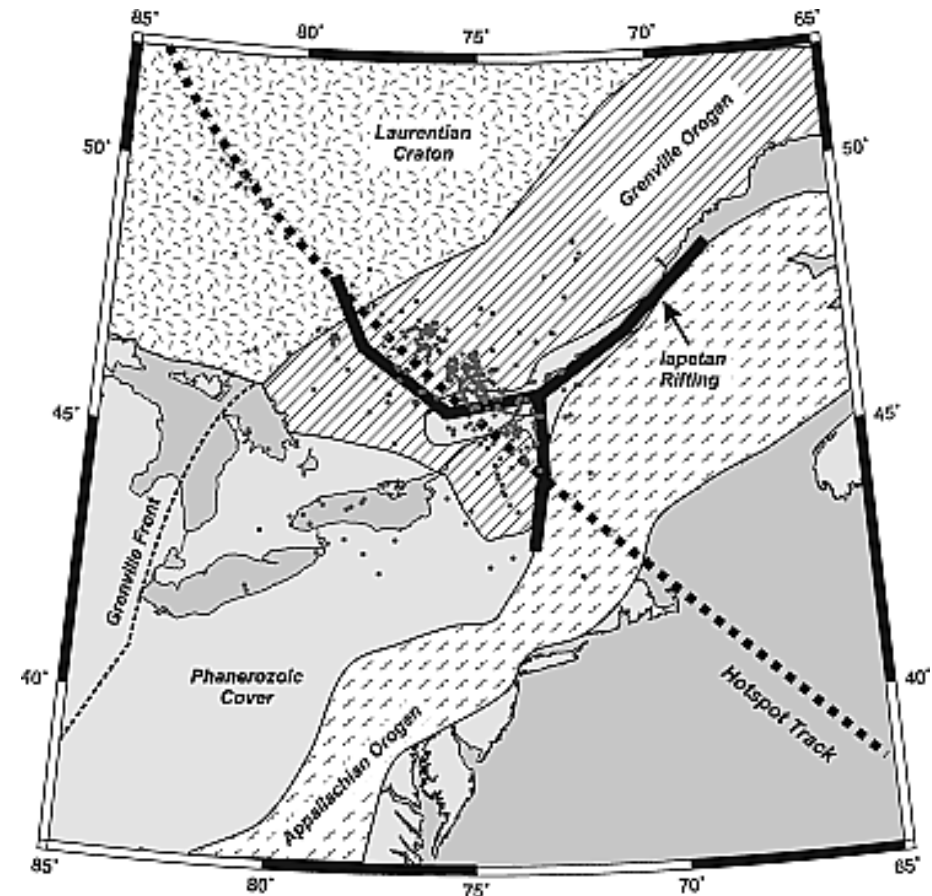


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What Causes Earthquakes in Ontario?

- Generally earthquakes occur near the edges of tectonic plates
- “Intraplate” earthquakes in Eastern Canada are from:
 - The Great Meteor Hotspot track and its intrusions
 - Reactivation of ancient faults
 - Postglacial rebound
 - Previous large earthquakes in the area

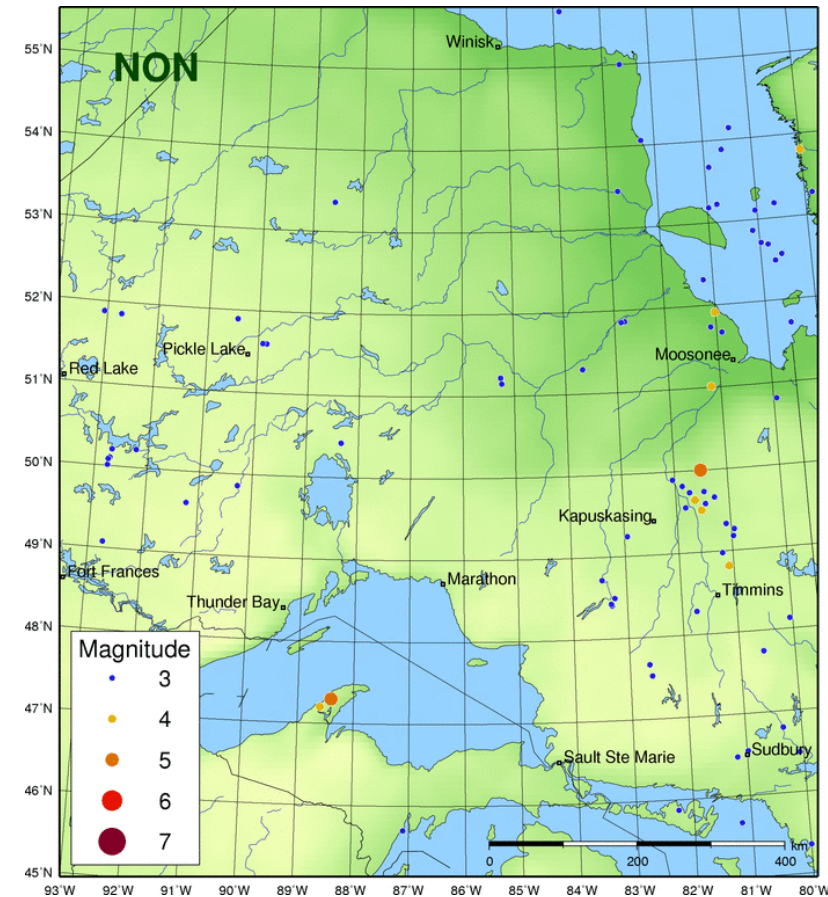


Ma & Eaton, 2007



What Causes Earthquakes in Ontario?

- Northern Ontario Seismic Zone
 - Very low level of seismicity

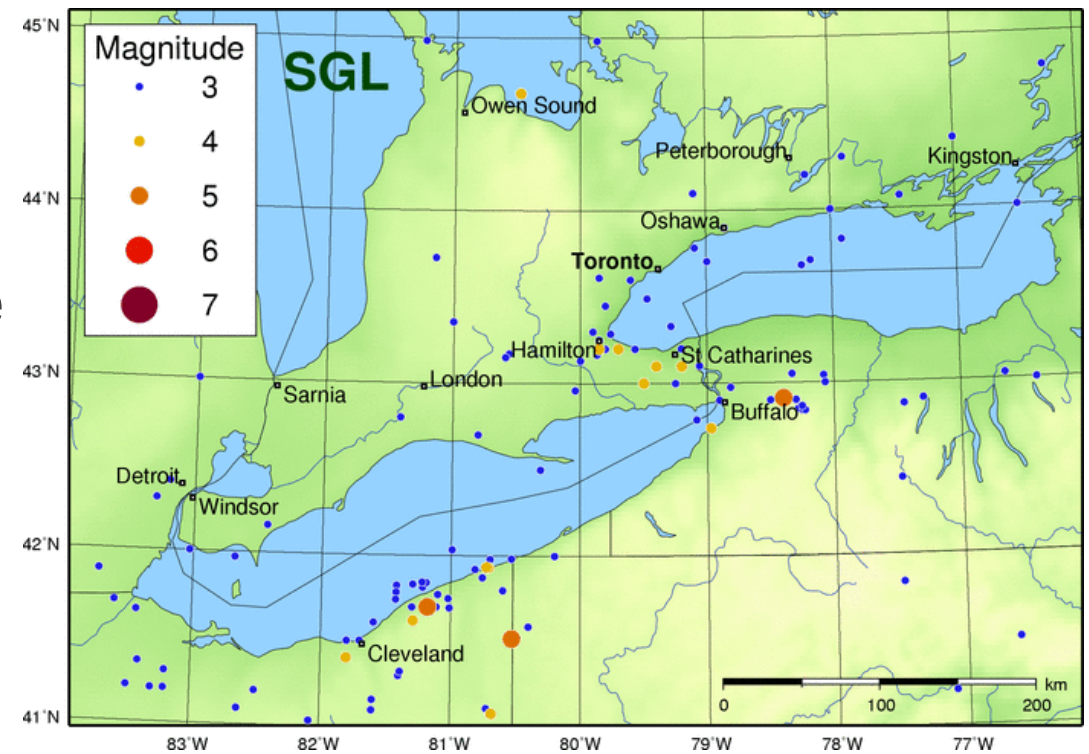


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What Causes Earthquakes in Ontario?

- Northern Ontario Seismic Zone
 - Very low level of seismicity
- Southern Great Lakes Seismic Zone
 - Low to moderate seismicity rate
 - Only $M > 5$ events on the US side of the border



Likely Impacts

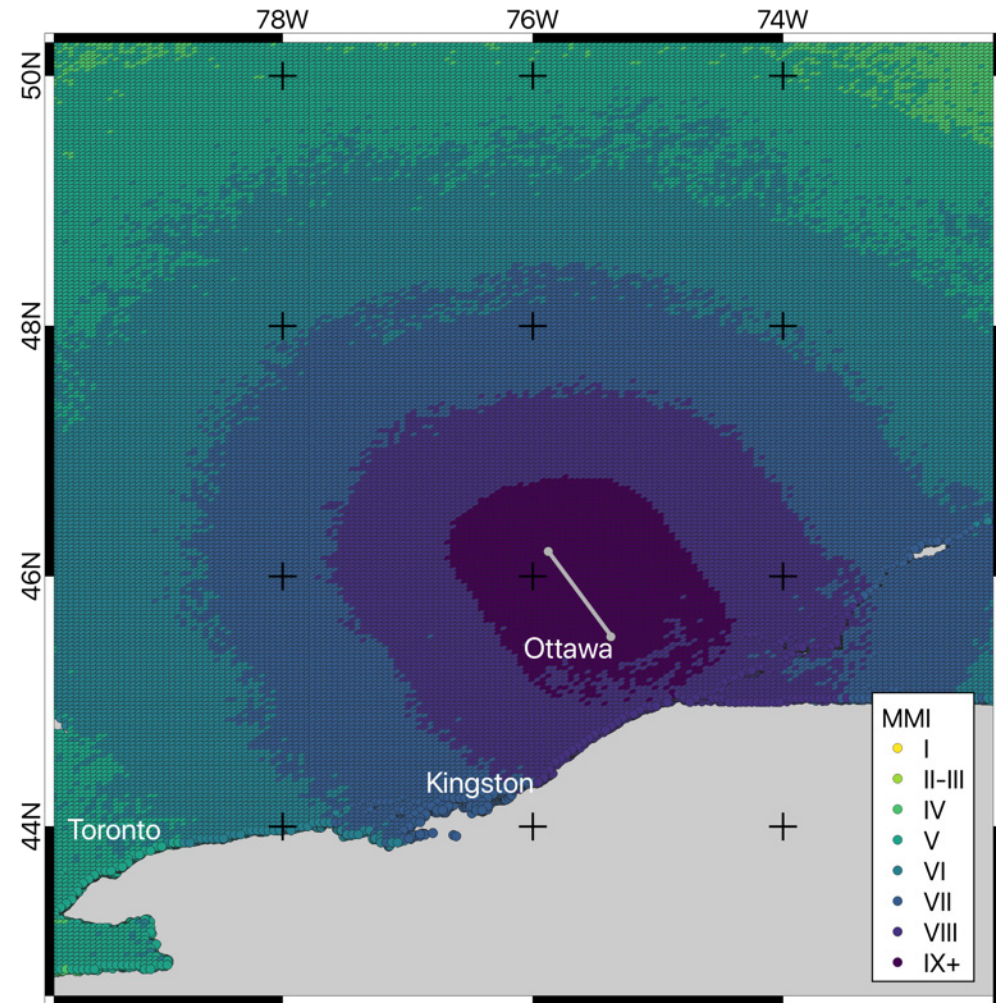


- Damage to buildings
 - Especially where soil is thicker
- Interruptions to roadways
- Disruption of critical infrastructure
 - Pipelines, powerlines, supply chains, telecommunications, etc.
- Landslides & liquefaction
- Injuries
- Economic Losses

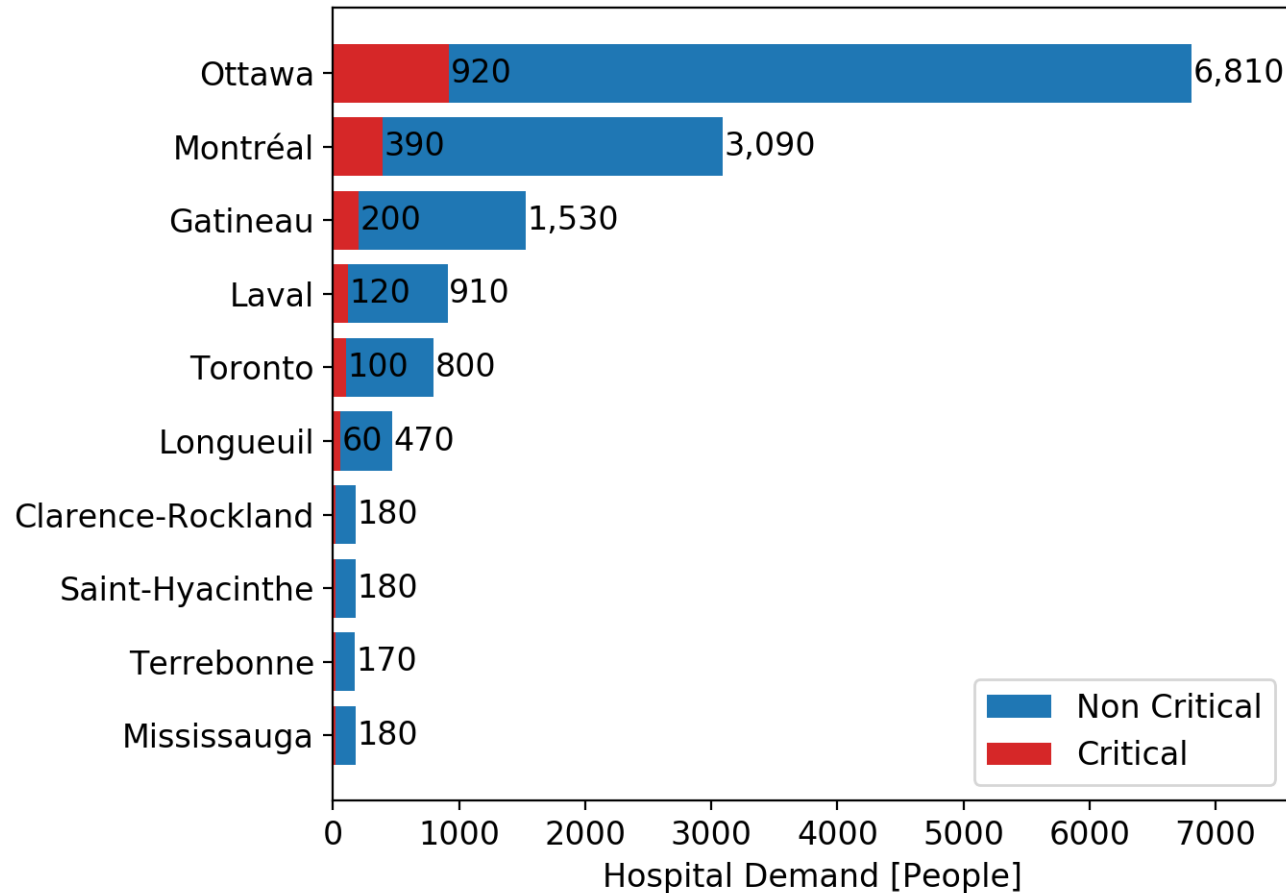


Scenario: Magnitude 7.5 near Val-des-bois

- Shaking felt across Ontario, Quebec and Maritimes
- Light shaking in Toronto and Violent-Extreme shaking in Ottawa
- It would be very difficult to walk during this event, lasting minutes



Scenario: Magnitude 7.5 near Val-des-bois



- Fatalities: 6,000
- Critical injuries: 3,000
- Non critical hospital injuries: 21,000
- First aid: 61,000
- Displaced households: 250,000

Scenario: Magnitude 7.5 near Val-des-bois



Gary B. Edstrom (Public Domain)

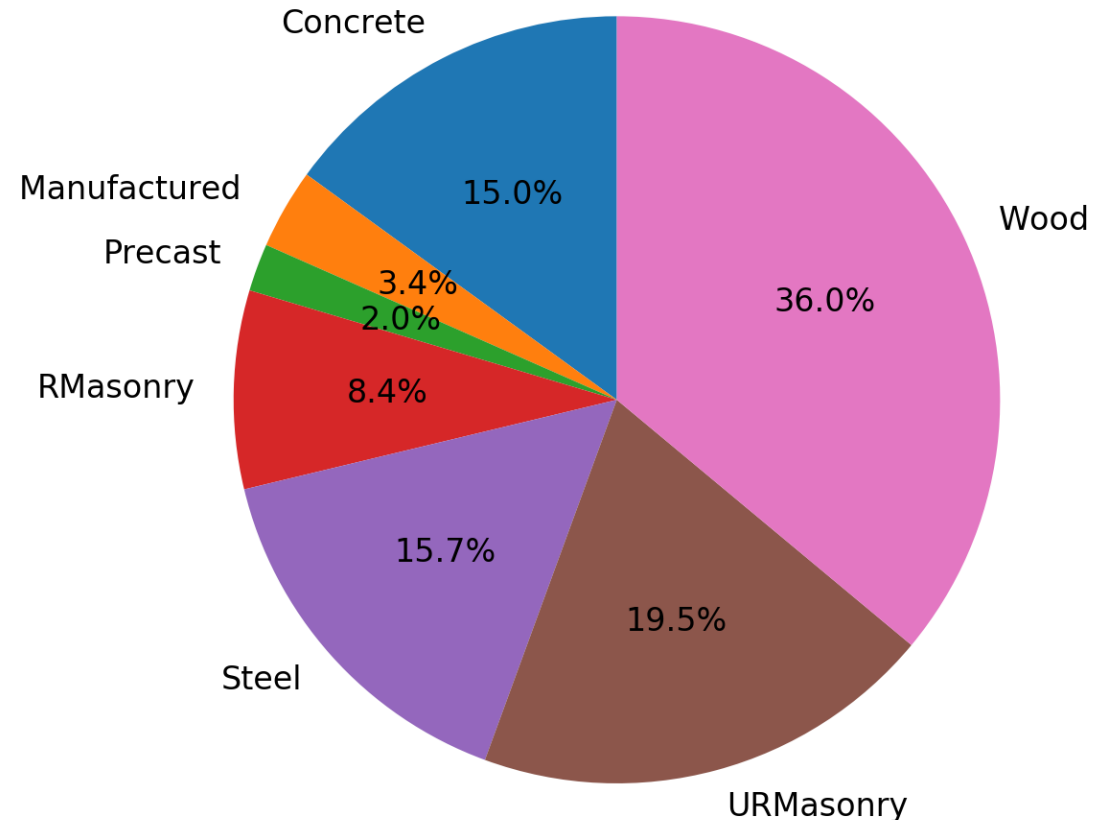


Carlos Varela (CC BY 2.0)



Scenario: Magnitude 7.5 near Val-des-bois

- 35,000 buildings would be uninhabitable (red-tagged)
- 20,000 buildings conditionally habitable (yellow-tagged)
- Most damaged buildings are pre-1970's wood, unreinforced masonry and steel





Thank you

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