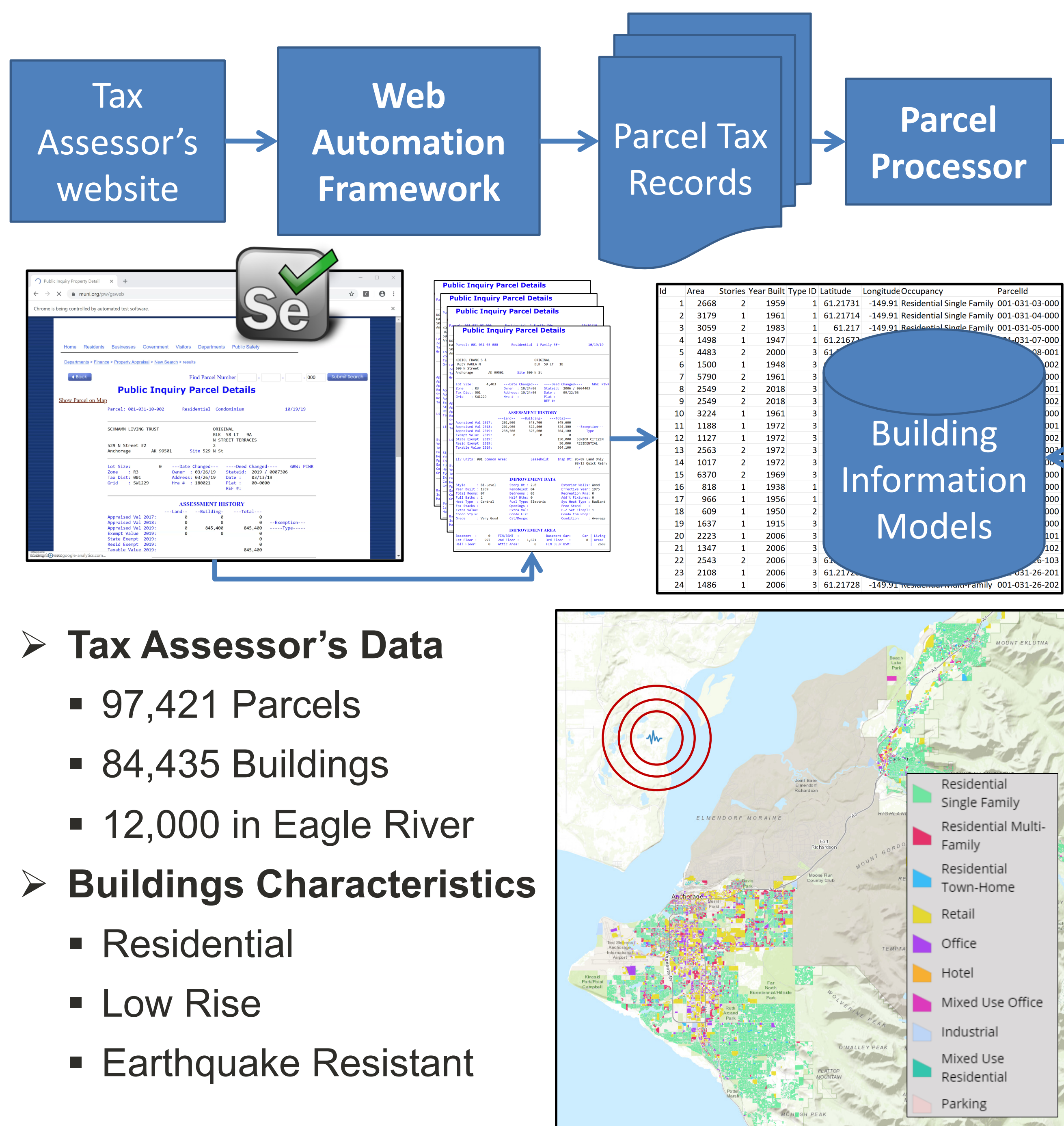# Regional Simulation of Anchorage M7.1 Earthquake using rWHALE
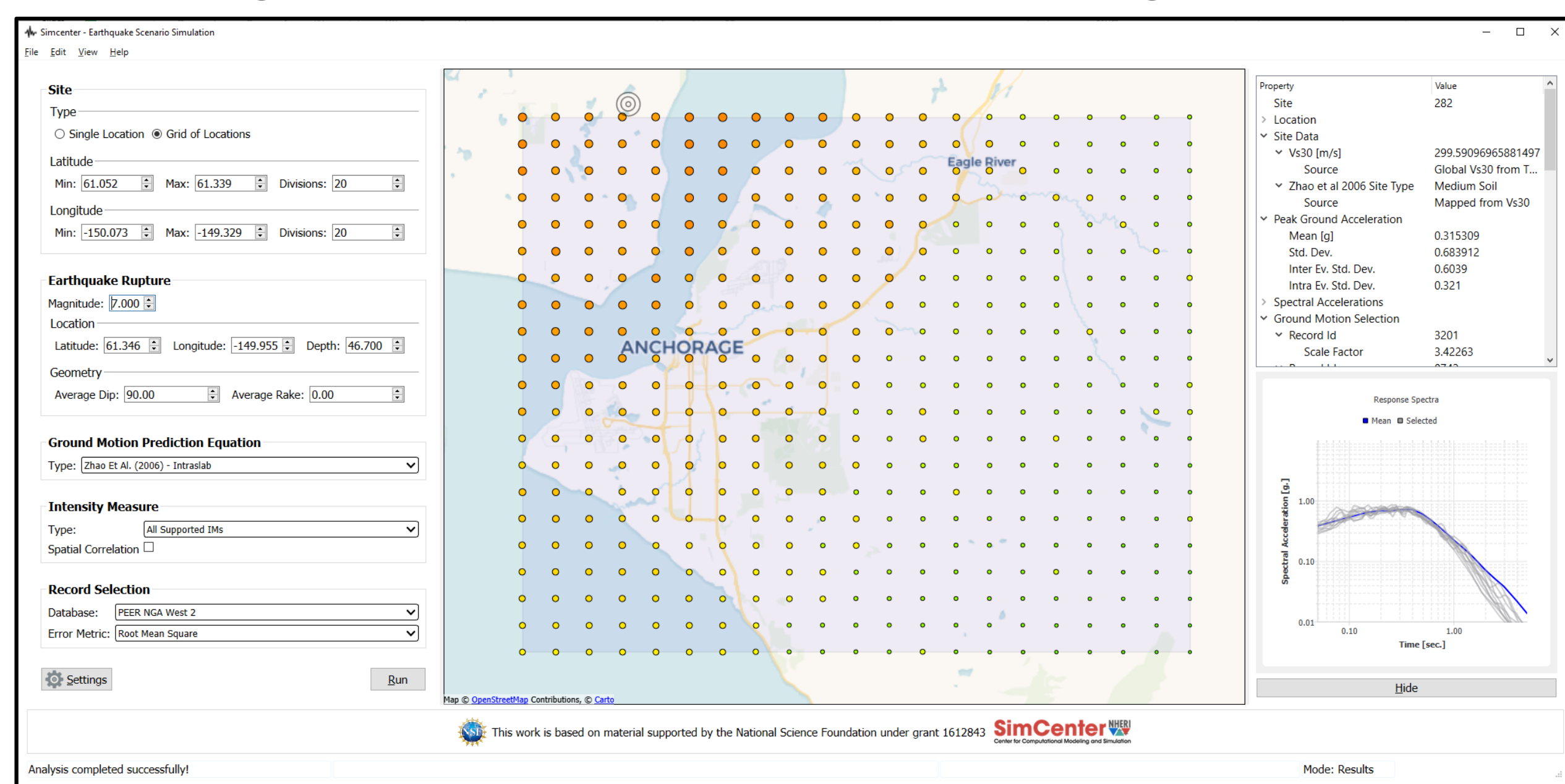
NHERI Center for Computational Modeling and Simulation

Buildings Inventory Development

Tax Assessor's website → Web Automation Framework → Parcel Tax Records → Parcel Processor → Building Information Models

> ### Tax Assessor's Data
> - 97,421 Parcels
> - 84,435 Buildings
> - 12,000 in Eagle River

> ### Buildings Characteristics
> - Residential
> - Low Rise
> - Earthquake Resistant

Legend:
- Residential Single Family
- Residential Multi-Family
- Residential Town-Home
- Retail
- Office
- Hotel
- Mixed Use Office
- Industrial
- Mixed Use Residential
- Parking

Ground Motion Characterization

> ### Scenario-Based Ground Motion Simulation
> - Spatially Correlated Intensity Measures
> - Regional Records Selection & Scaling

OPENSHA DEV

PEER Ground Motion Database
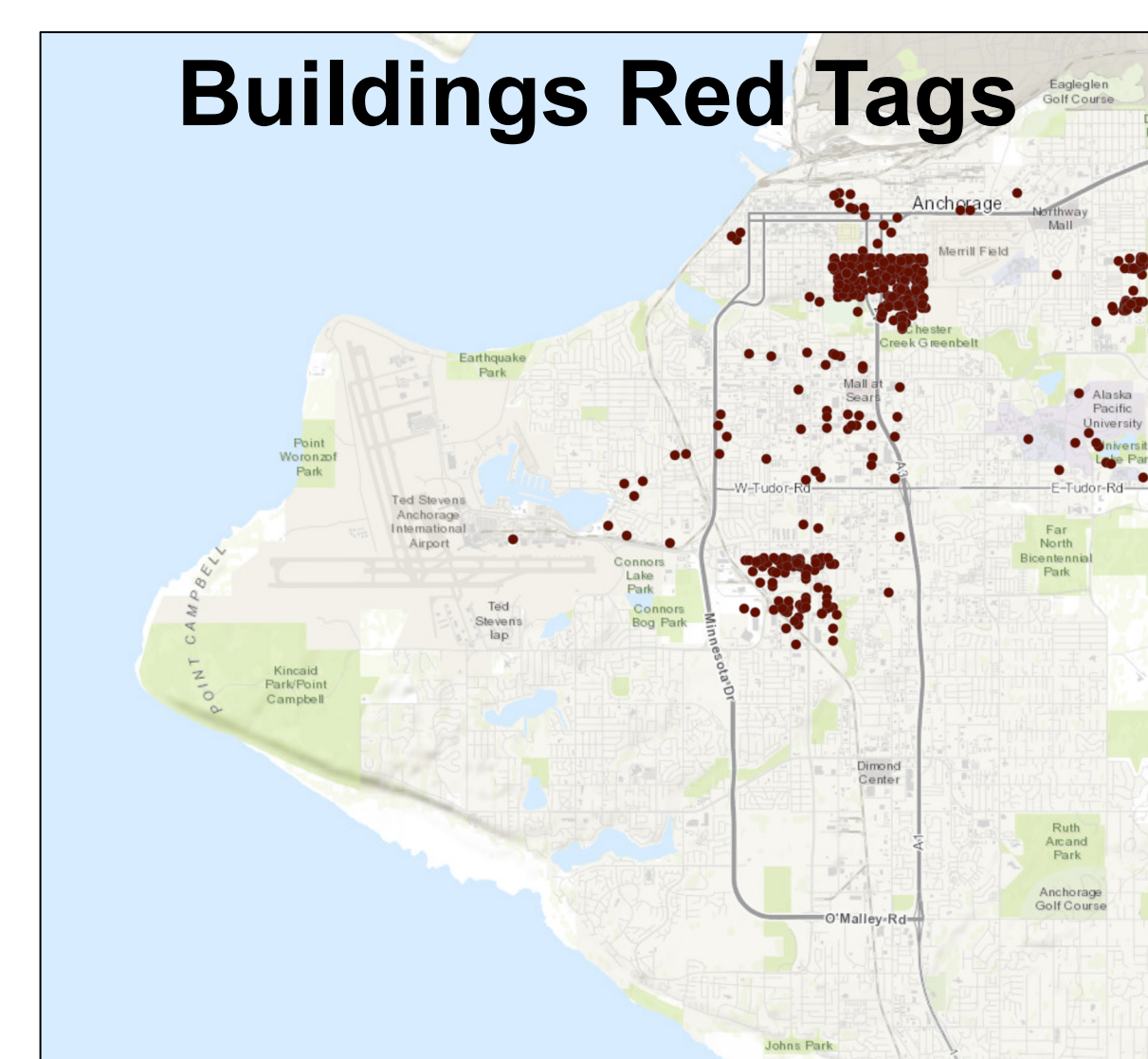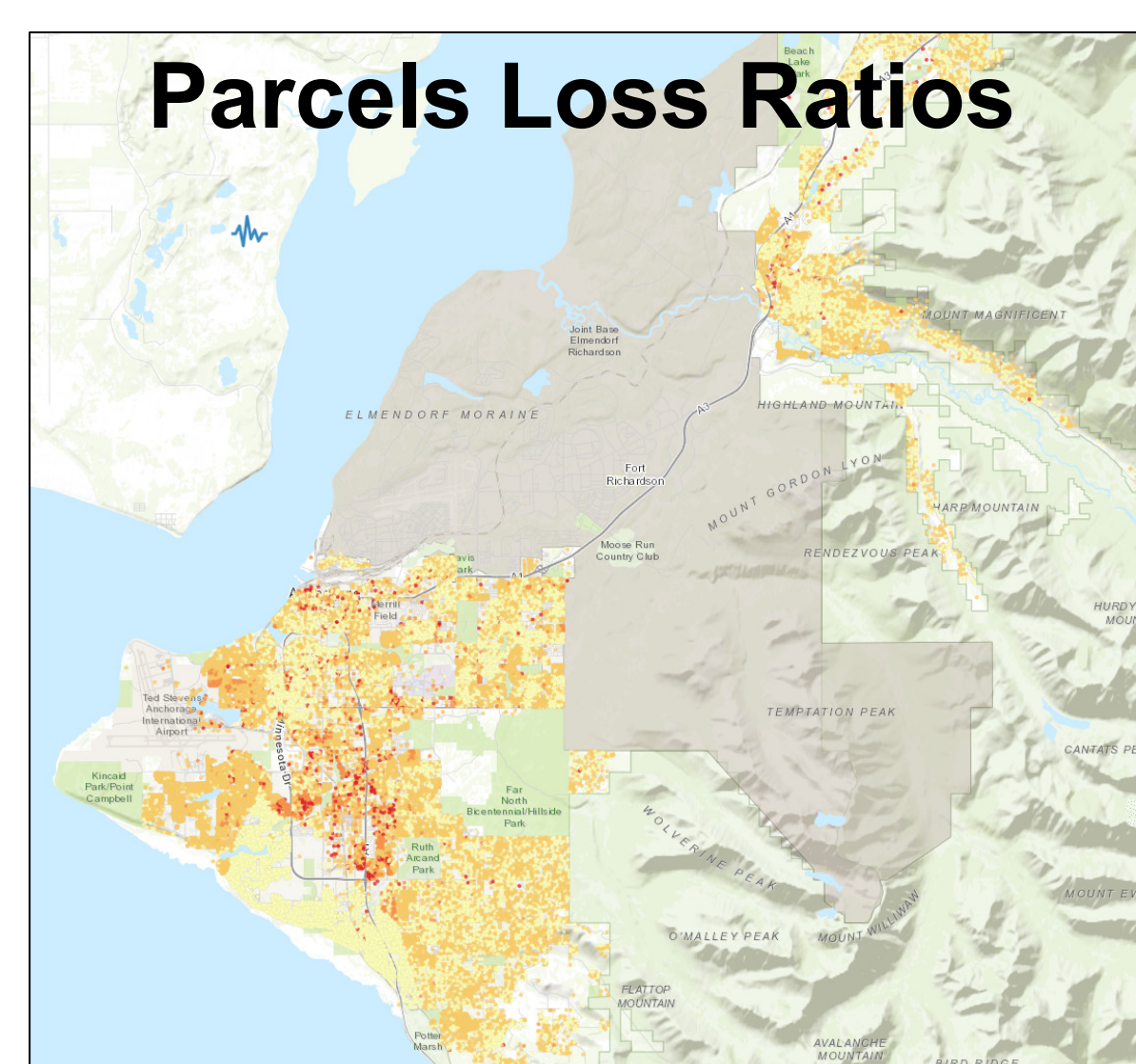Pacific Earthquake Engineering Research Center

✓ **Seismic Hazard Analysis**
- o Ground Motion Models
- o Earthquake Rupture Forecasts

✓ **Site Data Providers**
- o Soil Classification

EQ Hazard (OpenSHA Wrapper) + Record Selection & Scaling + PEER Database Client → PEER Ground Motions Database

Preliminary Results

Parcels Loss Ratios

Buildings Red Tags

	Recorded GM	Simulated GM
Repair Cost [$Billion]	7.5	7.3
Red Tags	3800	626
Loss Ratio [%]	14.5	12.5

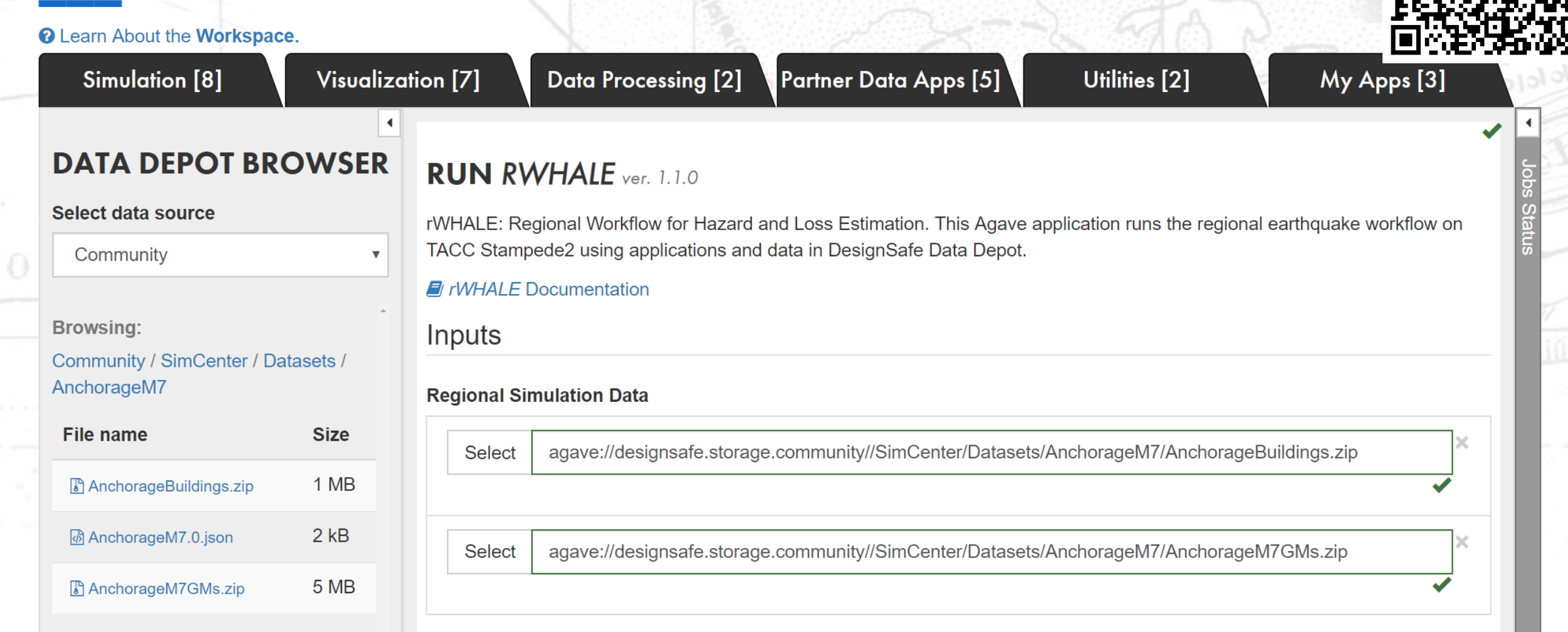> ### Research Opportunities
> - Calibrate, Verify & Validate Computational Models
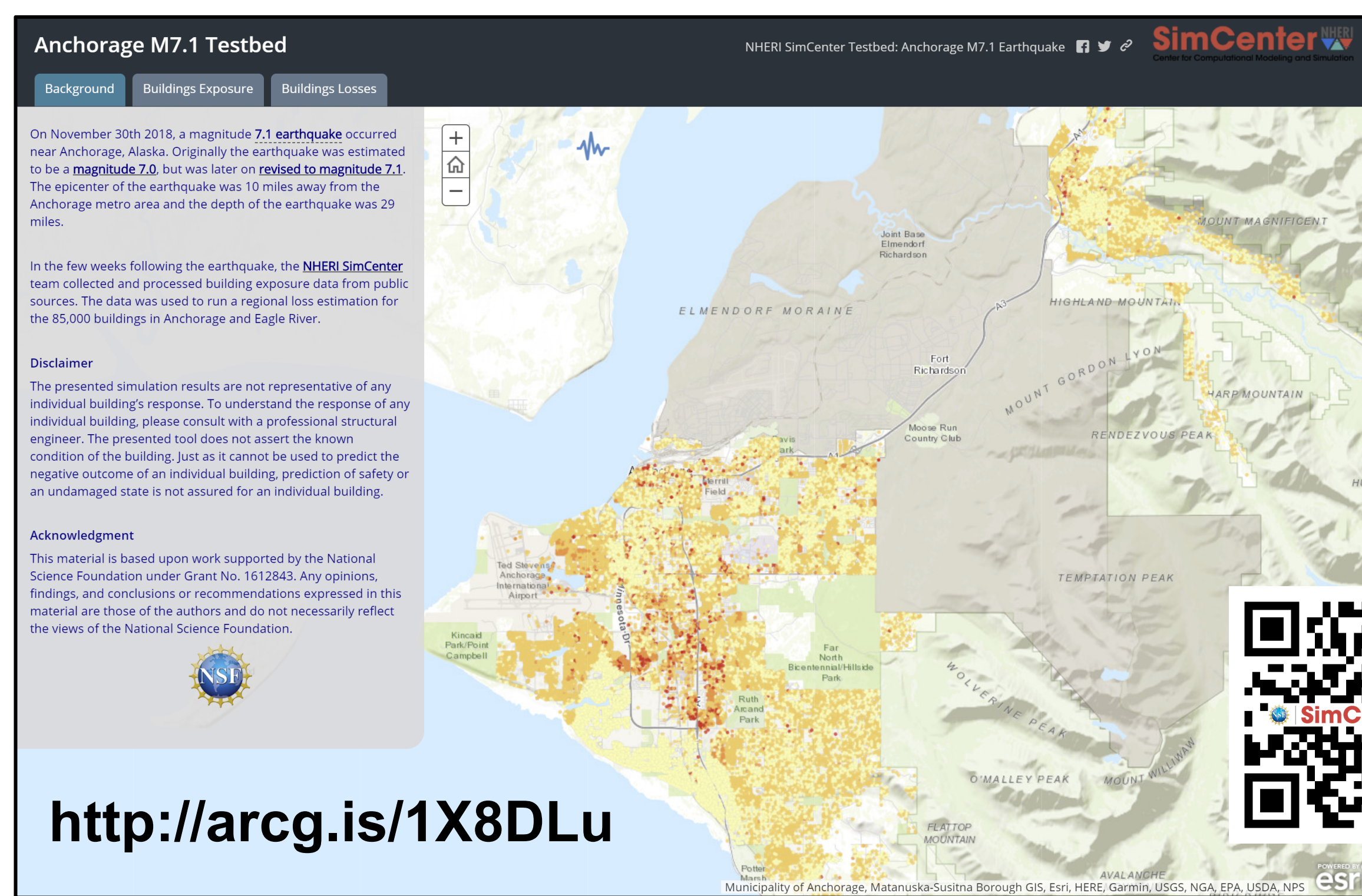
rWHALE

> ### Cloud app accessible through DesignSafe-CI
> - Runs regional simulations on Stampede2 HPC
> - Parallel computation on multiple nodes leveraging hundreds of processing cores

WORKSPACE

RUN RWHALE ver. 1.1.0

rWHALE: Regional Workflow for Hazard and Loss Estimation. This Agave application runs the regional earthquake workflow on TACC Stampede2 using applications and data in DesignSafe Data Depot.

DATA DEPOT BROWSER

File name	Size
AnchorageBuildings.zip	1 MB
AnchorageM7.0.json	2 kB
AnchorageM7GMs.zip	5 MB

Anchorage Testbed Story Map

> ### Documents the input, results and process

http://arcg.is/1X8DLu