



DESIGNSAFE-CI

A NATURAL HAZARDS
ENGINEERING COMMUNITY



DesignSafe Cyberinfrastructure for Natural Hazards Research



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Dept. of Civil, Arch., and Env. Engineering
University of Texas at Austin*



DESIGNSAFE-CI
NHERI: NATURAL HAZARDS ENGINEERING RESEARCH INFRASTRUCTURE



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TACC

RICE

Florida Tech

What is DesignSafe?

- A web-based research platform to enable transformative research that protects human life and reduces damage during natural hazard events

DesignSafe Vision

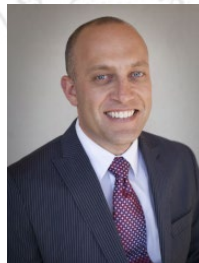
- A cyberinfrastructure (CI) that is an integral part of research discovery
 - Provide a platform for data sharing/publishing
 - Enable research workflows and access to high performance computing (HPC)
 - Deliver cloud-based tools that support the analysis, visualization, and integration of diverse data types
- Amplify and link the capabilities of natural hazards researchers in the US and abroad



DesignSafe Management Team



PI / Director
Ellen Rathje
Univ. of Texas



Co-PI
Scott Brandenburg
UCLA



Co-PI
Clint Dawson
Univ. of Texas



Co-PI
Jean-Paul Pinelli
Florida Inst. Tech.



Co-PI
Jamie Padgett
Rice Univ.



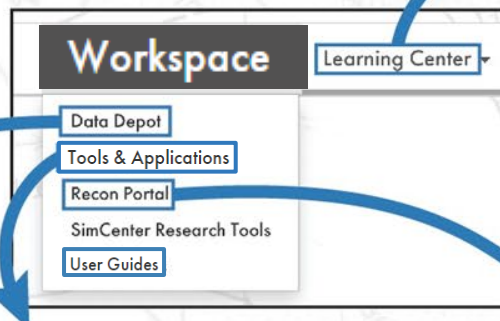
CI
Dan Stanzione
TACC/UT



Deputy Director
Tim Cockerill
TACC/UT

Portal Manager
Tracy Brown, TACC/UT
Project Manager
Natalie Henriques, TACC/UT





DesignSafe Tutorials

NEW End to End Multi-Threat Fragility Modeling using DesignSafe
December 3, 2019
• Watch Tutorial

Introduction to STKO
November 18, 2019
• Watch Tutorial

Leveraging Python, Jupyter Notebooks, DesignSafe, and the SimCenter Educational Tools in the Classroom
October 29, 2019
• Watch Tutorial

DATA DEPOT

Find in Published Projects

Add

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Box.com
Dropbox.com

Publication Type
☐ Experimental ☐ Simulation ☐ Hybrid Simulation

Project Title
Collaborative Research: Development, experimental validation and case studies for the next generation of landslide tsunami models for coastal hazard mitigation (Simulation)

TOOLS & APPLICATIONS

Learn About the Workspace

Simulation [7]	Visualization [8]	Data Processing [2]	Partner Data Apps [5]
ADCIRC ADCIRC	clawpack C	Dakota D	LS-DYNA LS-DYNA

Recon Portal

Learn more about contributing.

Show filter options

2019 Hurricane Dorian
First Landfall is at Cat 5: Elbow Cay, Abaco Islands of the Bahamas
[View Data]

2019 Hurricane Barry
Louisiana Gulf Coast
[View Data]

A map of the Gulf of Mexico and surrounding landmasses, with numerous blue location pins indicating specific points of interest or data collection sites.

www.designsafe-ci.org



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Data Depot

DATA DEPOT

+ Add

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Published

Published (NEES)

Community Data

Help ▾

Find in My Projects



Rename

Move

Copy

Preview

Preview Images

Download

Move to Trash

Project ID	Project Title	Project PI	Last Modified
PRJ-2752	CEC Project geohazards group	Paolo Zimmaro	9/15/20 2:31 AM
PRJ-2889	Earthquake Time Series from Events in Texas, Oklahoma, and Kansas	Ellen Rathje	9/11/20 2:02 PM
PRJ-2662	Displacement and subsurface characteristics of select lateral spread locations from the 2011 Christchurch, New Zealand earthquake	Ellen Rathje	9/1/20 9:52 AM
PRJ-1822	Hybrid Simulation Test Project	Keith Strmiska	8/24/20 5:01 PM
PRJ-2859	NEES, The George E. Brown, Jr. Network for Earthquake Engineering Simulation, 2004-2014 A DECADE OF EARTHQUAKE ENGINEERING RESEARCH	Julio Ramirez	8/14/20 12:13 PM
PRJ-2157	Simulations of Seismic Displacement of a Clay Slope using LS-Dyna	Ellen Rathje	8/11/20 2:24 PM
PRJ-2331	RAPID Data for DesignSafe Site Visit	Jeffrey Berman	8/3/20 3:54 PM
PRJ-1716	Bidirectional Testing of Drywall Partition Walls with Novel Details, Integrated into a Rocking Wall Subassembly	Keri Ryan	7/29/20 11:26 PM
PRJ-2824	Numerical modeling of lateral spread displacements at free-face sites using	Michael Little	7/13/20 4:48 PM



DATA DEPOT

Add

My Data

My Projects

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Box.com

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Google Drive

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Published (NEES)

Community Data

Help

Find in Data Depot

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PRJ-2363 | Soil-Foundation-Structure Interaction Effects on the Cyclic Failure Potential of Silts and Clays

Download Dataset

PI
Brandenberg, Scott

CoPIs
Stewart, Jonathan

Project Type
Experimental

DOI(s) in Dataset
10.17603/ds2-e7s5-b025
10.17603/ds2-jpwh-nq72

Keywords
Cyclic Shearing, Fine-Grained Soil, Soil-Foundation-Structure Interaction

Earthquake-induced ground failure has resulted in billions of dollars of damage during exhibiting either "sand-like" or "clay-like" behavior with respect to strength loss during soils, which are less well understood than "sand-like" soils. Cyclic failure of fine-grained and not in the free-field soils away from the structures, indicating that soil-foundation-centrifuge model testing to study cyclic failure of fine-grained soils beneath structures containing all of the experimental measurements and metadata required for users to

View Data Diagram

Experiment | Centrifuge Test on Bentonite Clay - Test UCLA JZB01

Experiment Type
Centrifuge

Author(s)
Buenker, Jason; Brandenberg, Scott; Eslami, Mohammad; Stewart, Jonathan

Experimental Facility
Center for Geotechnical Modeling, UC Davis

Equipment Type
9m Radius Dynamic Geotechnical Centrifuge

Date of Experiment
08-21-2017 — 08-26-2018

Date of Publication
01-03-2020

DOI
10.17603/ds2-e7s5-b025

License(s)
Open Data Commons Attribution

Report | Data Processing

Report | Digital Data Report (JZB02)

Model Configuration | Centrifuge Model (JZB02)

Sensor Information | Centrifuge (JZB02)

Event | CPT (JZB02)

Event | Fast Data from Spinning

Data collected at 5000 Hz

01162019@082639@

01162019@082639@

01162019@082639@

01162019@082639@

01162019@082639@122026@77.0rpm.bin

01162019@082639@125704@77.0rpm.bin

Citation

Buenker, J. Brandenberg, S. Eslami, M. Abundis, D. Buckreis, T. Stewart, J. (2020) "Centrifuge Test on Bentonite Clay - Test UCLA JZB01", in *Soil-Foundation-Structure Interaction Effects on the Cyclic Failure Potential of Silts and Clays*. DesignSafe-CI. <https://doi.org/10.17603/ds2-e7s5-b025>.

Download Citation



Make ★your★ data count!

Make your research re-producible and your data re-usable



- **Formally publish** data sets in stable data repositories
 - DesignSafe, Zenodo, Dataverse, figshare, Dryad, others
- Data needs a permanent, **digital location (DOI)** not just a URL
 - List curated data sets on your CV, just like papers
- Cite data publication **in your reference list** of your paper using DOI, citation language

provided here. Additionally, the probabilistic approaches described in this paper are implemented as executable Jupyter notebooks (Saygili 2018a, b). These notebooks can be accessed in the Data

References

Saygili, G., Rathje, E., and Wang, Y. (2018a). "Probabilistic seismic hazard analysis for the sliding displacement of rigid sliding masses [Data set]." Designsafe-CI (<https://doi.org/10.17603/ds22d6k>)



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Data Reuse Examples



Journal of Wind Engineering and Industrial Aerodynamics

Volume 196, January 2020, 104026



UFFLORIDA **NHERI**
Powell Family Structures and Materials Laboratory

Low-rise gable roof buildings pressure prediction using deep neural networks

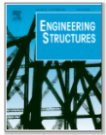
Jianqiao Tian ^a, Kurtis R. Gurley ^c, Maximillian T. Diaz ^a, Pedro L. Fernández-Cabán ^{b, d}, Forrest J. Masters ^c, Ruogu Fang ^a

Annual DesignSafe Dataset Awards



Engineering Structures

Volume 221, 15 October 2020, 111101



Observations and analysis of wind pressures on the floor underside of elevated buildings

Jae H. Kim ^a, Mohammadtaghi Moravej ^b, Elaina J. Sutley ^a, Arindam Chowdhury ^c, Thang N. Dao ^d

FIU

Journal of Performance of Constructed Facilities / Volume 34 Issue 4 - August 2020

Technical Papers

Downloaded 144 times

Performance of Manufactured Housing during Hurricanes Irma and Michael

Elaina J. Sutley, Ph.D., A.M.ASCE; Karen Vazquez, S.M.ASCE; Jae H. Kim, S.M.ASCE; Thang Dao, Ph.D., A.M.ASCE



StEER
STRUCTURAL
EXTREME EVENTS
RECONNAISSANCE



DESIGNSAFE-CI
NHERI: NATURAL HAZARDS ENGINEERING RESEARCH INFRASTRUCTURE



UCLA

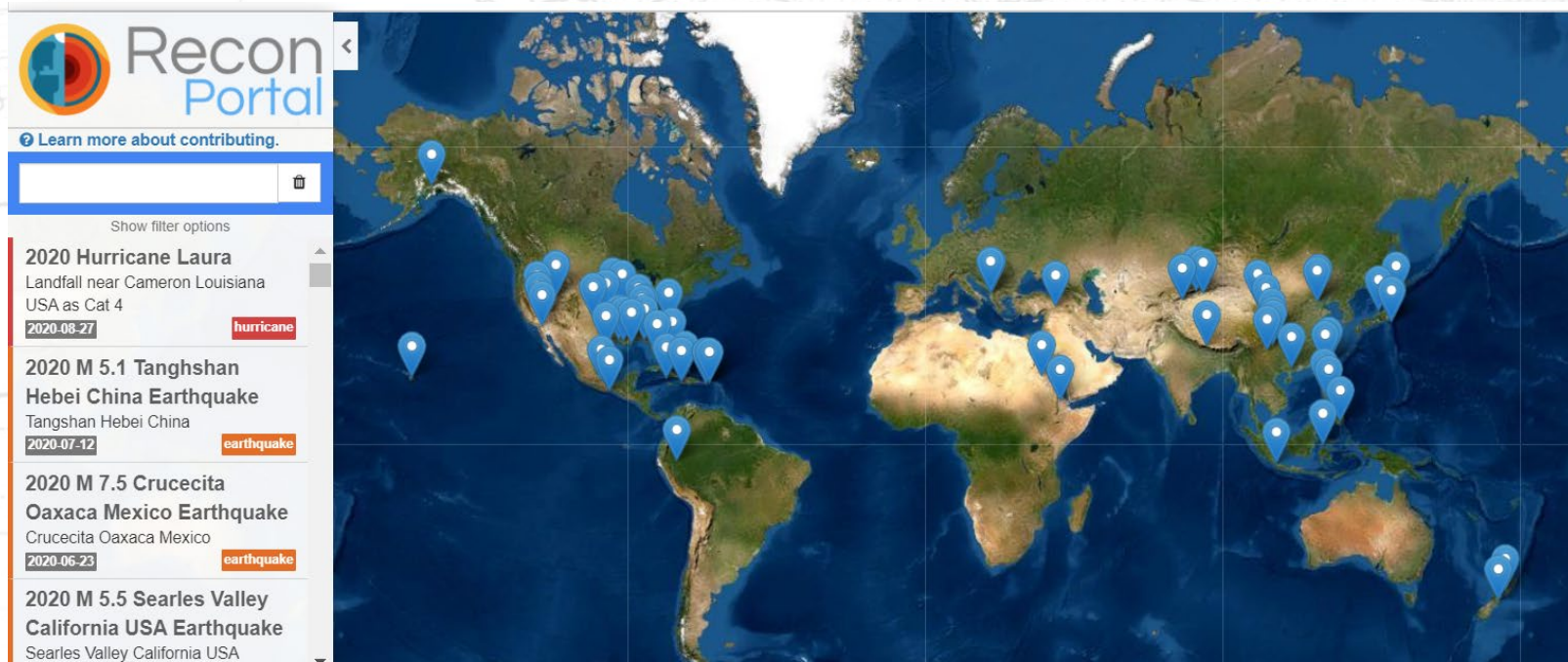
TACC

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Reconnaissance Portal

Identifying Published Datasets from Recon Events

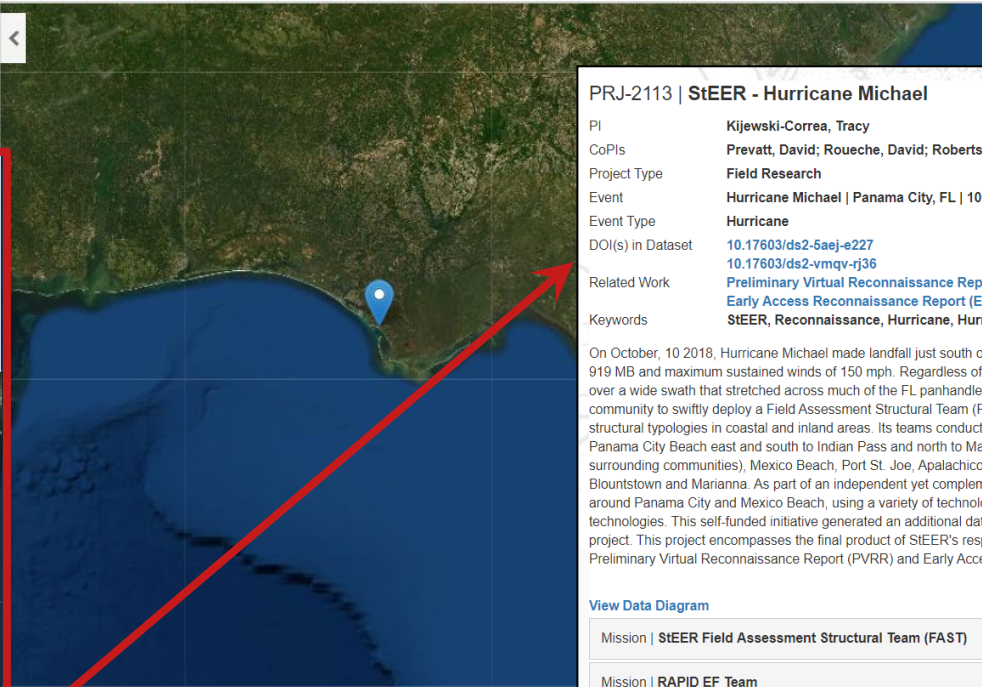


Recon Portal → Data Depot

**Recon Portal**
[Learn more about contributing.](#)

Available datasets:

- Hurricane Michael - StEER P-VAT Report
- Hurricane Michael Field Reconnaissance: Contrasting Performance of Structures at Design Wind Speeds
- ARA Windfield Data Day
- Hurricane Michael - StEER FAT Early Access Report
- NHERI REU: Assessing Structural Damage During Hurricane Michael of Low-Rise Large-Volume Steel Structure using Structure-from-Motion and LIDAR
- NHERI REU: Survey and Investigation of Residential Buildings Damaged by Hurricane Michael
- Assessing the Performance of Elevated Wood Buildings Including Manufactured Housing
- Finalized StEER FAST and RAPID EF teams reports



PRJ-2113 | StEER - Hurricane Michael
[Download Dataset](#)

PI	Kijewski-Correa, Tracy
CoPIs	Prevatt, David; Roueche, David; Robertson, Ian; Berman, Jeffrey; Mosalam, Khalid; Grilliot, Michael
Project Type	Field Research
Event	Hurricane Michael Panama City, FL 10-10-2018 Lat 30.0800° N Long 85.6075° W
Event Type	Hurricane
DOI(s) in Dataset	10.17603/ds2-5aej-e227 10.17603/ds2-vmqv-rj36
Related Work	Preliminary Virtual Reconnaissance Report (PVRR) Early Access Reconnaissance Report (EARR)
Keywords	StEER, Reconnaissance, Hurricane, Hurricane Michael, Damage Assessment, UAS, Laser Scan, Streetview

On October, 10 2018, Hurricane Michael made landfall just south of Panama City, FL with the National Hurricane Center reporting a minimum pressure 919 MB and maximum sustained winds of 150 mph. Regardless of its place in history, Hurricane Michael caused catastrophic damage from high winds over a wide swath that stretched across much of the FL panhandle and inland into southeastern GA and beyond. natural hazards engineering community to swiftly deploy a Field Assessment Structural Team (FAST). This FAST broadly assessed the performance of a representative subset of structural typologies in coastal and inland areas. Its teams conducted assessments between October 13-15, 2018. FAST collected data in Florida from Panama City Beach east and south to Indian Pass and north to Marianna. The communities assessed included: Panama City Beach, Panama City (and surrounding communities), Mexico Beach, Port St. Joe, Apalachicola, a few routes out to barrier islands in the region, and the inland communities of Blountstown and Marianna. As part of an independent yet complementary effort, the RAPID EF continued data collection on November 7-8, 2018 in and around Panama City and Mexico Beach, using a variety of technologies including unmanned aerial vehicles, laser scanners and applied streetview technologies. This self-funded initiative generated an additional dataset that complements the data collected by StEER and is thus curated jointly in this project. This project encompasses the final product of StEER's response to this event: Curated Dataset, linking to previously published products: Preliminary Virtual Reconnaissance Report (PVRR) and Early Access Reconnaissance Report (EARR).

View Data Diagram

Mission StEER Field Assessment Structural Team (FAST)	☒
Mission RAPID EF Team	☒

**E-ICI**
Engineering Research Infrastructure

**TEXAS**
The University of Texas at Austin

**UCLA**

**TACC**

**RICE**

*Florida Tech*

Tools & Apps: Simulation

TOOLS & APPLICATIONS

[Learn About Tools & Applications.](#)

Simulation	SimCenter Tools	Visualization	Analysis	Hazard Apps	Utilities	My Apps
ADCIRC 	ANSYS 	clawpack 	Dakota 	LS-DYNA 	OpenFOAM 	
OpenSees 	rWHALE 					

- HPC-enabled simulation codes (Stampede2, Frontera)
- Available through portal or at the Command Line, easy access to HPC allocation (CPUs, GPUs) through DesignSafe

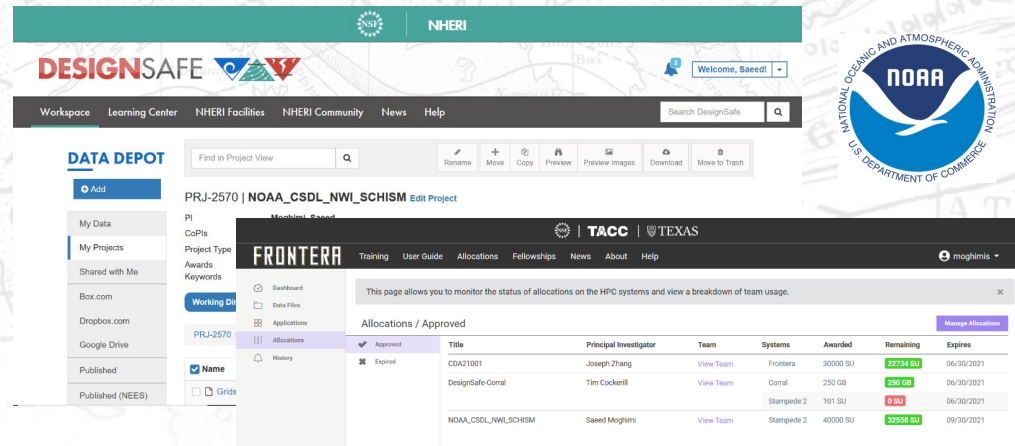


Simulation Support

- Assistance in installing codes on TACC HPC systems
- Inland-Coastal Flooding Operational Guidance System (ICOGS)

NOAA's inland coastal flood modeling system that enhances modeling capabilities for wet storms with storm surge and heavy precipitation

Contact: Saeed.Moghimi@noaa.gov



The screenshot displays two web interfaces. The top interface is DESIGNSAFE, showing a workspace with a sidebar for 'DATA DEPOT' and a main area for project management. The bottom interface is the TACC Frontera portal, showing a table of allocations.

Title	Principal Investigator	Team	Systems	Awarded	Remaining	Expires
CDIA21001	Joseph Zhang	View Team	Frontiera	30000 SU	22734 SU	06/30/2021
DesignSafe-Coral	Tim Cockerill	View Team	Coral	230 GB	230 GB	06/30/2021
			Stampede 2	101 SU	0 SU	06/30/2021
NOAA_CSDL_NWL_SCHISM	Saeed Moghimi	View Team	Stampede 2	40000 SU	32558 SU	09/30/2021



Tools & Apps: Data Analysis

Simulation [8]	Visualization [9]	Data Processing [2]	Partner Data Apps [5]	Utilities [2]	My Apps [8]
FigureGen F	HazMapper 	Kalpana K	Paraview 	Potree Converter P	Potree Viewer P
QGIS Desktop 3.8.1 	STKO S	Visit 	Jupyter 	MATLAB 	

- Cloud-based tools for data analysis and visualization
- Access to files in Data Depot

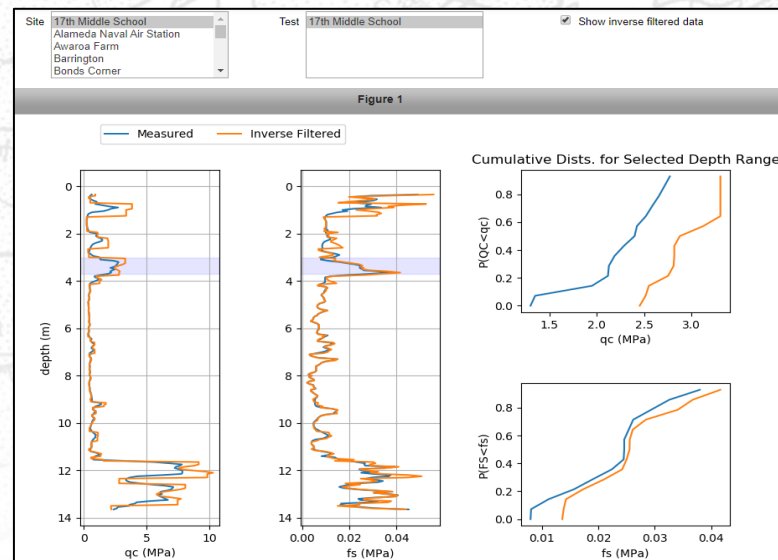


Jupyter Notebooks



- Electronic notebooks in Python or R
- JupyterHub in DesignSafe
 - Access to Data Depot files
- Interactive data viewer
- Can write scripts for data processing, AI or machine learning
- Publish for use by others
- Accelerates data reuse, adoption of approaches into practice

Next Generation Liquefaction



From Scott Brandenburg (UCLA)



Interoperability with USGS EQ Hazard Tools

+

 Add

My Data

My Projects

Shared with Me

Box.com

Dropbox.com

Google Drive

Published

Community Data

[Learn About 'My Projects'](#)

Published

PRJ-169 DISPLAC

PI

Date of Publication

Project Type

Description

The seismic p
project include
expected slidin
hazard in term
notebook inter
directly from th
(2009). Probab

APPLICATION OF PROBABILISTIC FRAMEWORK FOR FLEXIBLE SLIDING DISPLACEMENTS VECTOR (PGA, PGV) APPROXIMATION

Reference: Rathje, E.M., Wang, Y., Stafford, P.J., Antonakos, G. and Saygılı, G., 2014. Probabilistic assessment of the seismic performance of flexible sliding displacements. *Bulletin of Earthquake Engineering*, 12(3), pp. 1071-1090

Click here to show/hide the code

DEAGGREGATION INPUT

Latitude

37.75

Longitude

-122.11

Site Class

B/C Boundary (760 m/s)

Spectral Period*

Peak Ground Acceleration

*USGS provides deaggregation data for the above spectral periods only

RETURN PERIODS

Return periods used in this analysis (years):

30

43

72

108

144

224

336

475

712

975

1462

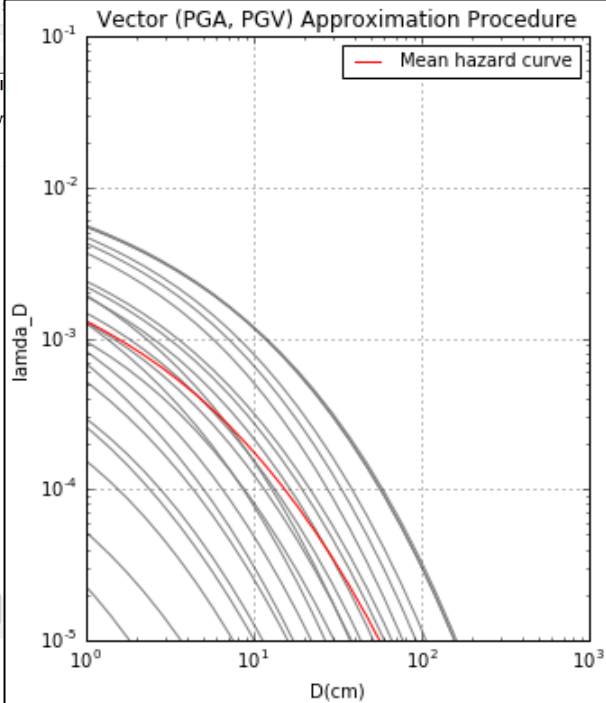
1950

2475

- Return periods can be between 1 and 20,000 inclusive
- Please make changes on the [return_periods.csv](#) file to edit the return periods



Vector (PGA, PGV) Approximation Procedure







- Easy access to images and point cloud data
- Location and preview exposed
- Link to Potree viewer provided
- Links to Streetview imagery (Mapillary)

HazMapper sharifim

Maps: Map_1

Assets

Point Clouds

Layers

Filters

322531

Download

Metadata

Assessment_type	"Single Family Residence"
Building_address_admin_area	"Texas"
Building_address_country	"United States"
Building_address_full	"2011 South Kossuth St., Rockport, Texas 78382"
Building_address_locality	"Rockport"
Building_address_postal_code	78382

Lat: 47.6456 Lon: -122.2896

96972

View

Metadata

Geometry: Polygon

Area (m²) 161731.9877286004 1

Bounding Box

	Latitude	Longitude
Min	47.6501437109597	-122.308231325997
Max	47.6535931484506	-122.302614622767



Learning Center



Workspace

Learning Center

Education & Training

Archived DesignSafe Webinars

<https://tinyurl.com/DesignSafe-Webinars>

DesignSafe Tutorials

NEW

Development and utilization of a relational database to support post-earthquake building damage and recovery assessment

March 12, 2021

- [Watch Tutorial](#)

Experimental Data Workflow for Real Time Decision Making Using Python and Jupyter Notebooks

February 3, 2021

- [Watch Tutorial](#)

Leveraging DesignSafe with TAPIS

December 17, 2020

- [Watch Tutorial](#)

Best Practices to Enhance the Quality, Discoverability and Re-Use Potential for Post-Event Reconnaissance Data

November 11, 2020

- [Watch Tutorial](#)
- [Presentation Slides](#)

SimCenter Webinars

NEW

Physical Modeling of Wave Attenuation & Wave Force Reduction by a Mangrove Forest

December 4, 2020

- [Watch Webinar](#)

Computational Frameworks for the Implementation of Performance-Based Wind Engineering

November 23, 2020

- [Watch Webinar](#)

Partial Turbulence Simulation for Predicting Peak Wind Loads on Buildings

October 16, 2020

- [Watch Webinar](#)

Hurricane Loss Analysis for Single-Family Houses Considering Current and Changing Climate Conditions

October 6, 2020

- [Watch Webinar](#)



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DesignSafe: We are here for you!

Available to the Global Natural Hazards Research Community



**Analyze,
Simulate
& Share**



**Start Your
Experiments**



**Expand
Your Skills**



**Join the
Community**



- Interact with us and the community using the DesignSafe Slack team
- Cite data using DOIs in your reference list!



Please share your feedback, ideas, experiences!

Ellen Rathje e.rathje@mail.utexas.edu



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