



# DESIGNSAFE-CI

A NATURAL HAZARDS  
ENGINEERING COMMUNITY



## A Cyberinfrastructure for Natural Hazards Research



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DESIGNSAFE-CI   
NHERI: NATURAL HAZARDS ENGINEERING RESEARCH INFRASTRUCTURE



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# What is DesignSafe?

- A web-based research platform that enables transformative research to protect human life and reduce 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





- Data Depot
- Workspace
- Recon Portal
- SimCenter Research Tools
- User Guides

based research  
 network that  
 provides the  
 tools needed to  
 understand critical  
 research.

 **Learn how to**  
 Start Using DesignSafe

 **Browse the Data Depot's**  
 Published Data Sets

 **Join the conversation in**  
 DesignSafe's Slack Channel

 **Learn more about**  
 NHERI, the NCO & DesignSafe



**NHERI Five-Year  
 Science Plan  
 2nd Edition**



NATURAL HAZARDS ENGINEERING RESEARCH INFRASTRUCTURE  
**FIVE-YEAR SCIENCE PLAN**  
 MULTI-HAZARD RESEARCH TO MAKE A MORE RESILIENT WORLD

*Storm surge, Hurricane Ike, Bolivar Island Texas, 2008 (Credit: Spencer Rogers)*

**The NHERI Five-Year Science Plan, revised for 2020**  
 The second edition of the Five-Year Science Plan, spearheaded by NSF's Natural Hazards Engineering Research Infrastructure (NHERI), calls researchers across disciplines to solve the pressing problems that natural hazards present to communities in the U.S. and around the world.

[FIND MORE NEWS IN THE NEWSROOM](#)



# DesignSafe Research Workbench

- Data Depot Data Repository
  - Private space (My Data)
  - Collaboration space (My Projects) for data sharing and ultimate publishing
  - Publicly accessible space (Published) for curated data from My Projects
  - Publicly accessible space (Community Data) for uncurated data
- Discovery Workspace
  - Apps/tools for computational simulation, data analysis, visualization, etc. with access to files in Data Depot
- Reconnaissance Portal: discover published field data associated with natural hazard events





# Discovery Workspace

## WORKSPACE

Learn About the Workspace.

Simulation [8] Visualization [7] Data Processing [2] Partner Data Apps [5]

Jupyter ML\_DesignSafe\_Tutorial Last Checkpoint: 20 hours ago (autosaved)

File Edit View Insert Cell Kernel Widgets Help

Run

### (0) Importing Required Libraries

```
In [7]: import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import sys
sys.path.insert(0, '/home/jupyter/community/Machine_Learning_Bootcamp/')
```

### (1) Importing Dataset

```
In [8]: #Import a pickle file using pandas library.
Harvey = pd.read_pickle('/home/jupyter/community/Machine_Learning_Bootcamp/Merged_Harvey_2G.
#Harvey = pd.read_pickle('/home/jupyter/community/Machine_Learning_Bootcamp/Merged_Harvey_3G

#Display histograms of various variables.
Harvey["overall_building_condition"].value_counts()

#Display the entire dataframe.
Harvey.tail(15)
```

Out[8]:

	overall_building_condition	max_mph	age_yrs	number_of_stories	roof_shape	roof_cover	wall_cladding
715	0	85	18.0	1.0	Gable	Asphalt shingles (3-tab)	Hardie Board Siding
716	1	5	40.0	1.0	Flat	Metal shingle	Sheet metal
718	0	110	5.0	2.0	Hip	Asphalt shingles (3-tab)	Stucco
725	1	85	72.0	1.0	Gable	Continuous Surface	Wood Siding
726	0	100	34.0	2.0	Hip	Asphalt shingles (3-tab)	Wood Siding

- Cloud-based tools and HPC enabled simulation codes and resources
- JupyterHub for Python and R scripts
  - Can be used for data analysis/viewing, AI/ML models, access to HPC, etc.



# Reconnaissance Portal

## *Identifying Archived Datasets from Recon Events*

The screenshot displays the Reconnaissance Portal interface. On the left, a list of events is shown with their dates and categories. On the right, a world map is displayed with blue location pins indicating the sites of these events.

Event Name	Date	Category
2019 Hurricane Dorian	2019-09-02	hurricane
2019 Hurricane Barry	2019-07-13	hurricane
2019 Ridgecrest, CA Earthquake Sequence	2019-07-04	earthquake
2019 Yibin City, Sichuan China Earthquake	2019-06-17	earthquake
2019 Linwood, Kansas Tornado	2019-05-28	tornado



# Recon Portal → Data Depot → Workspace

The image shows a composite of two web interfaces. On the left is the Recon Portal, displaying a project titled '2016 Kaikoura Earthquake' with a list of available datasets: 'Kaikoura Earthquake Reconnaissance', 'GEER Reconnaissance Report', and 'Landslide Inventory'. On the right is the HazMapper workspace, showing a 3D topographic map of the Kaikoura region with red markers indicating landslide locations. A layer list on the left of the map includes 'Wartman photos', 'Rathje Photos', 'Cow Slip Slide', 'Coastal Slide', 'Leader River Slide', 'Culvert', 'GPS tracks', and 'Landslide Inventory'. A 'Launch HazMapper' button is located at the bottom right of the workspace area.

formats. Maps can be created and edited in the HazMapper and shared with other researchers via the DataDepot.

Launch HazMapper



## DATA DEPOT

+ Add

My Data

My Projects

Shared with Me

Box.com

Dropbox.com

Google Drive

Published

Find in My Projects



Rename

Move

Copy

Preview

Download

Move to Trash

Project ID	Project Title	PI	Last Modified
PRJ-2440	Ridgecrest, CA earthquake, July 4, 2019	Scott Brandenburg	9/11/19 8:56 AM
PRJ-2531	TxDOT - Seismic Vulnerability and Post-Event Actions	Patricia Clayton	8/29/19 1:36 PM
PRJ-1716	NHERI TallWood Project_Task 4a	Shiling Pei	8/29/19 9:31 AM
PRJ-1437	Simulation Test Project	Ellen Rathje	8/28/19 2:31 PM
PRJ-2466	DesignSafe-QuakeCoRE Cyberinfrastructure Workshop	Ellen Rathje	8/27/19 2:53 AM
PRJ-1729	NHERI@UTexas Nonintrusive Sinkhole 3D-Imaging Workshop	Kenneth Stokoe	8/21/19 10:34 AM
PRJ-2504	Vorticity-Advection-RODSEX experiment	Steve Elgar	8/19/19 1:27 PM

***My Projects: A space to share files/data/results with collaborators and to eventually publish for public use***



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Find in Data Depot

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**Published**

Community Data

[Help](#)

## PRJ-2363 | SOIL-FOUNDATION-STRUCTURE INTERACTION EFFECTS ON THE CYCLIC FAILURE POTENTIAL OF SILTS AND CLAYS

PI **Brandenberg, Scott**  
CoPIs **Stewart, Jonathan**  
Project Type **Experimental**  
Keywords **Cyclic Softening, Fine-Grained Soil, Soil-Foundation-Structure Interaction**

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

### View Data Diagram

Experiment | **Centrifuge Testing on Kaolinite Clay - Test UCLA JZB02**

Experiment Type **Centrifuge**  
Authors **Buenker, Jason; Brandenberg, Scott; Stewart, Jonathan**  
Experimental Facility **Center For Geotechnical Modeling, UC Davis**  
Equipment Type **9m Radius Dynamic Geotechnical Centrifuge**  
Date of Experiment **10-24-2018 — 01-26-2019**  
Date of Publication **01-09-2020**  
DOI [Citation](#) **10.17603/ds2-jpwh-nq72**  
License(s) **Open Data Commons Attribution**

This experiment tested three structures resting on fine-grained soil consisting of non-plastic silts. A sequence of earthquake ground motions was applied to the model container. Measurements of bending strain, and axial strain.

Report | **Data Processing**

Report | **Data Processing**

Report | **Digital Data Report (JZB02)**

Model Configuration | **Centrifuge Model (JZB02)**

↳ Sensor Information | **Centrifuge (JZB02)**

↳ Event | **CPT (JZB02)**

↳ Event | **Fast Data from Spin 2 (Dynamic Shaking Applied)**

Data collected at 5000 Hz during shaking

- [01162019@082639@110817@77.0rpm.bin](#)
- [01162019@082639@112208@77.0rpm.bin](#)
- [01162019@082639@113803@76.8rpm.bin](#)
- [01162019@082639@115034@76.9rpm.bin](#)
- [01162019@082639@122026@77.0rpm.bin](#)
- [01162019@082639@125704@77.0rpm.bin](#)





+ Add

- My Data
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- Google Drive
- Published
- Community Data

Help ▾

Find in Published Projects

PRJ-2769 | Food Access Impact Survey for Southeast and Harris County, Texas after Hurricane Harvey in 2017

[Download Dataset](#)

PI **Rosenheim, Nathanael**  
 Project Type **Field Research**  
 Event **Hurricane Harvey | Southeast Texas | 08-25-2017 — 08-31-2017 | Lat 30.049840 Long -94.077210**  
 Event Type **Flood, Hurricane**  
 DOI(s) in Dataset **10.17603/ds2-aq2k-dy92**  
 Related work  
 Keywords **Field Research Planning, Food Access, Survey Instruments, Sample Frame**

Food insecurity is a chronic problem in the U.S. and annually affects over 40 million people under normal conditions. This reality dramatically worsens after disasters. Such events can disrupt both the supply and demand sides of food systems, restricting food distribution precisely when households are in heightened need of food assistance. Often, retailers and food banks must react quickly to meet local needs under post-disaster circumstances. Residents of Southeast Texas and Harris County experienced this problem when Hurricane Harvey made landfall on the Texas Gulf Coast in August 2017. The primary data collected by this project relate specifically to food access and infrastructure disruption after Hurricane Harvey. Two types of food suppliers were included in the research, food aid agencies and food retailers. First, the research team examined food aid agencies in Southeast Texas. Data collection methods included a focus group with eight food aid agency representatives, followed by an online survey that was completed by 53 representatives. The second population studied was food retailers. The in-person survey was conducted in three Texas counties, Jefferson, Orange, and Harris. In total, the food retail sample frame consisted of 3,425 food retailers, of which 568 food retailers were randomly sampled. Data were collected five to eight months after the event, which helped to increase the reliability and validity of the data. The perishable nature of natural hazards research requires that teams can quickly organize their efforts before entering the field. This archive is designed to help future research teams with example documents that may help reduce the amount of time needed to invest in project development. This archive does not contain Personally Identifiable Information.

[View Data Diagram](#)

Documents | **Food Retail Survey Instrument**

Our first published Field Research dataset with social sciences data!



Supporting  
integrated  
interdisciplinary  
datasets

Craig and Mahyar  
will explain how  
to curate your  
data to look like  
this!

PRJ-1234 | Hurricane Michael Structural Damage And Population Resilience [Download Dataset](#)

Project PI(s) [Peek, Lori; Wartman, Joseph](#)

Keywords Hurricane, Reconnaissance, Damage Assessment, Interviews, Children, Shelters

Natural Hazard Event Hurricane Michael | Florida | 10/7/2018 | [Lat 30.455690 Long -97.813780](#)

Event Type Hurricane, Storm Surge, Flood

This interdisciplinary social science and engineering data set includes damage assessment data collected five weeks after Hurricane Michael, as well as survey, interview, and observational data collected with parents and their children. This data may be of special interest to those seeking to understand the connections between damage to the built environment and associated social disruptions.

Documents Collection | **Virtual Reconnaissance**

Mission | **Mexico Beach - RAPID**

Date(s) of Mission 11/11/2018 - 11/15/2018

Author(s) [Hamideh, Sara; Huang, Shih-Kai; Sutley, Elaine; Fischer, Erica; Esnard, Ann-Margaret; Lyles, Ward; Merdjanoff, Alexis; Meyer, Michelle](#)

Site Location North Lake Estates | [Lat 30.455690 Long -97.813780](#)

Date of Publication 11/25/2018

DOI [Citation](#) 10.17603/ds2-z4hp-nv28

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During this initial wave, the research team collected damage assessment data in two neighborhoods, as well as surveyed and interviewed parents and children who were displaced from those neighborhoods. The intent is for the team to return for two to three more waves of data collection over the coming year.

Research Planning Collection | **RAPID Team Preparation**

Engineering/Geosciences Collection | **Water Tower**

Engineering/Geosciences Collection | **Blue Beach Area**

Engineering/Geosciences Collection | **Panama City to Mexico Beach**

Research Planning Collection | **Interviewer Preparation**

Social Sciences Collection | **Interviews & Observations at the Shelter - Children**

Social Sciences Collection | **Interviews, Surveys, & Observations at the Shelter - Parents**

## Organizational Structure

**Mission:** A group of data collections that are associated with a common goal, location, or time

**Collection:** Data grouped together based on a shared purpose in a project or mission.

