DesignSafe-CI

Ellen M. Rathje, Professor
University of Texas
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DESIGNSAFE-CI

A NATURAL HAZARDS ENGINEERING COMMUNITY

A Cyberinfrastructure for the Natural Hazards Community

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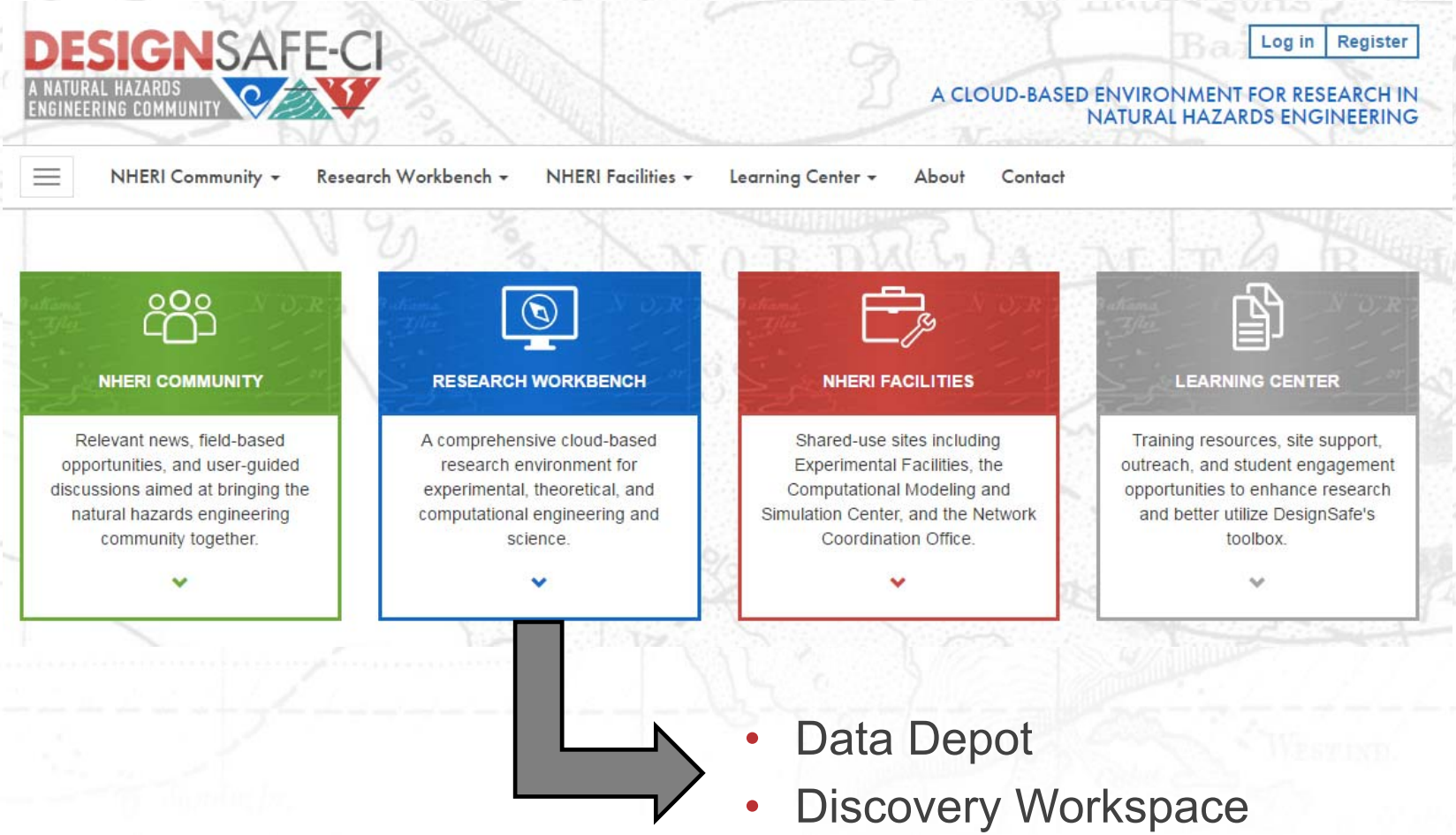
DesignSafe-ci.org Vision

- A CI that is an integral and dynamic part of research discovery
- Cloud-based tools that support the analysis, visualization, and integration of diverse data types
  - Key to unlocking the power of “big data”
- Support end-to-end research workflows and the full research lifecycle, including data sharing/publishing
- Enhance, amplify, and link the capabilities of the all NHERI components

DesignSafe-ci Cyberinfrastructure



- Data Depot
- Discovery Workspace

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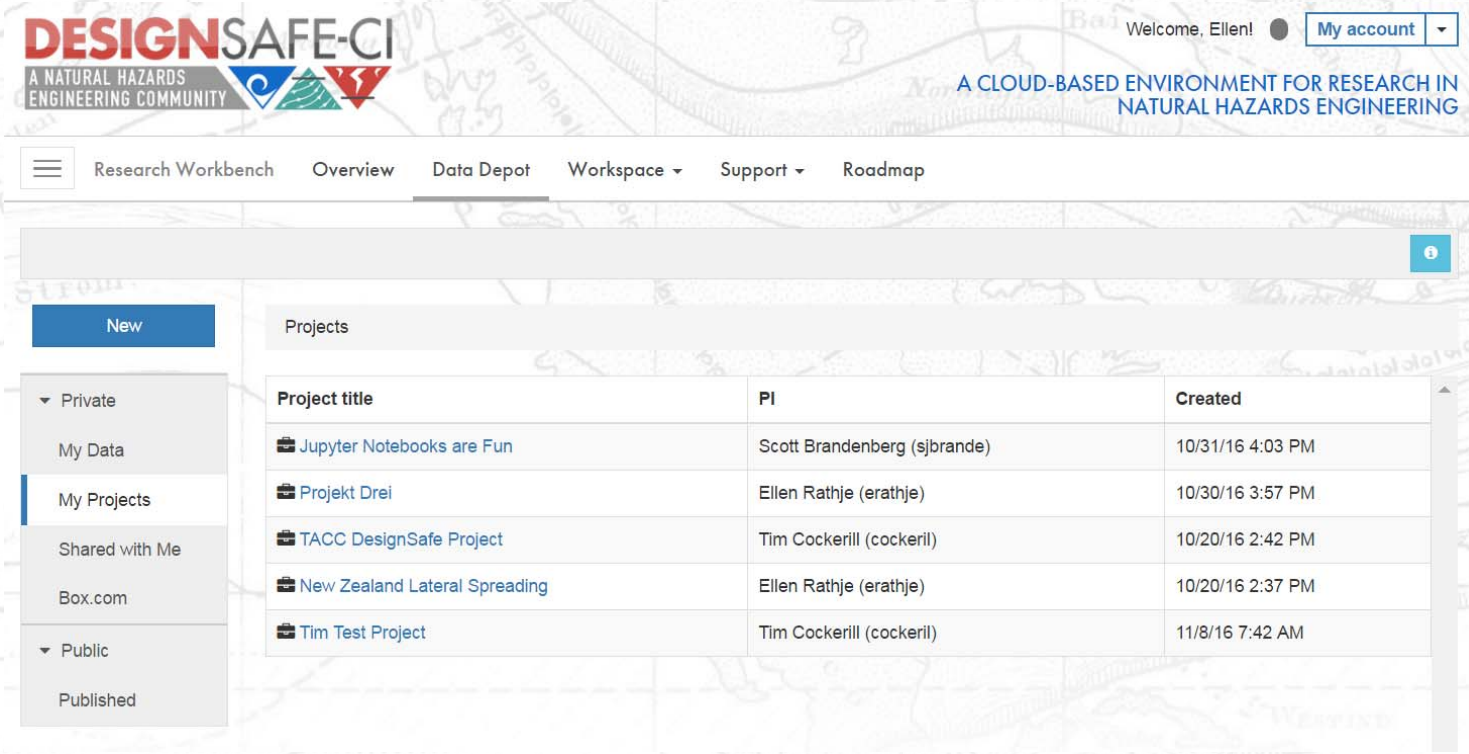
Data Depot Features

- Upload files/folders
- Different levels of access
  - My Data (fully private)
  - My Projects (shared space with collaborators)
  - Sharing of individual files with other users
  - Public data (including NEES data)
- Manage files within Data Depot (move, rename, etc)
- Data Depot files accessible for tools in the Discovery Workspace

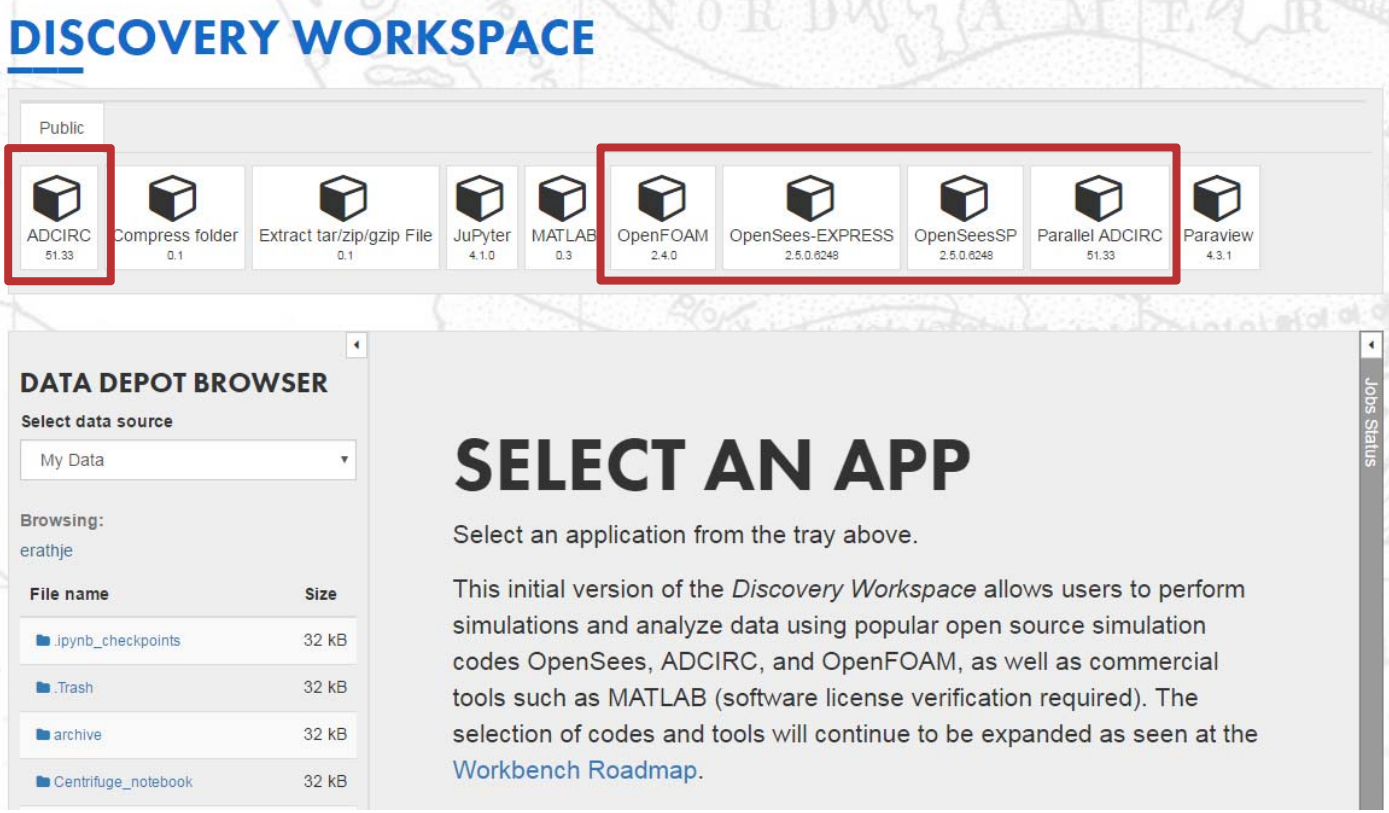
Data Depot Browser



- Working with EFs to upload bulk data to your Data Depot Project for sharing with you

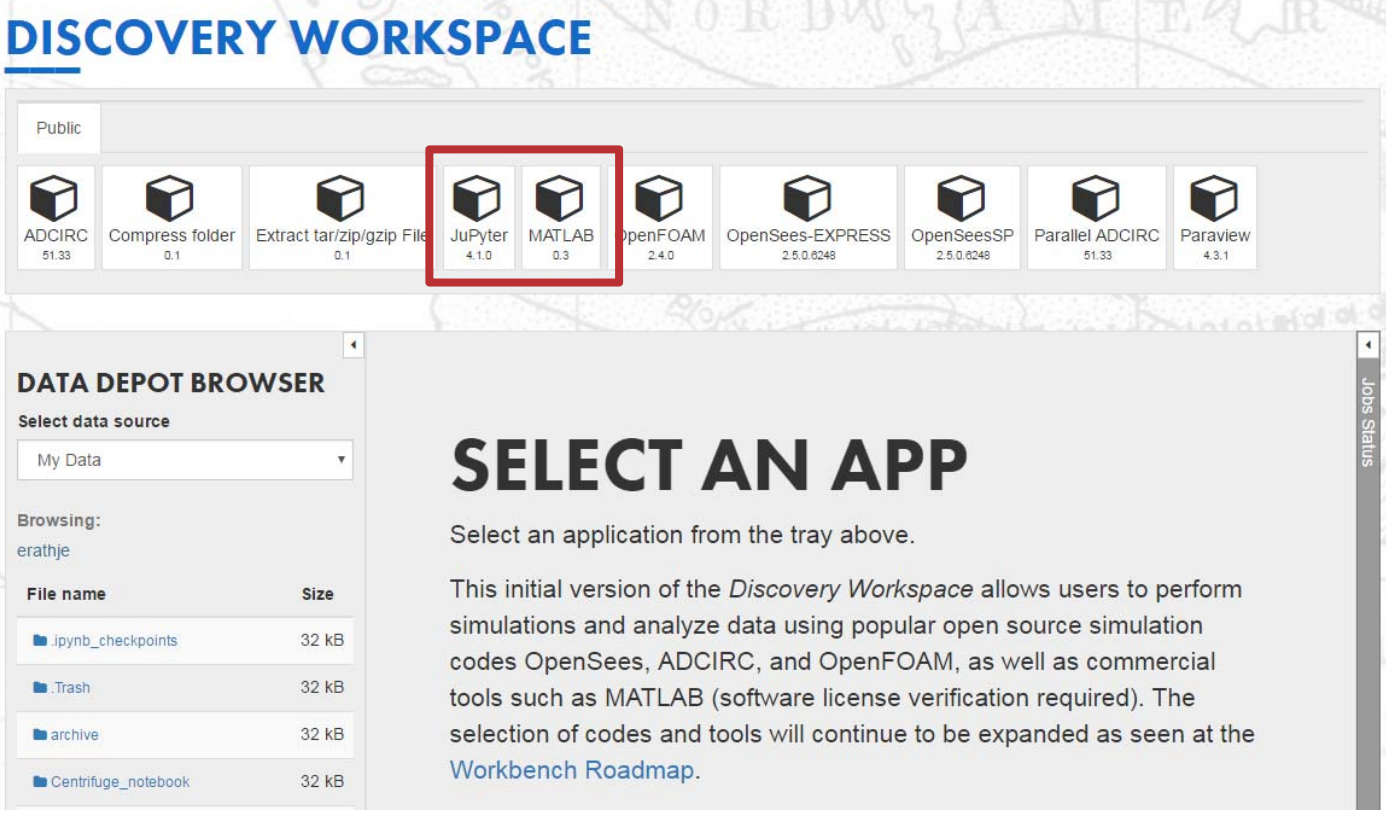
Discovery Workspace

- Simulation tools: OpenSees, ADCIRC, OpenFOAM,

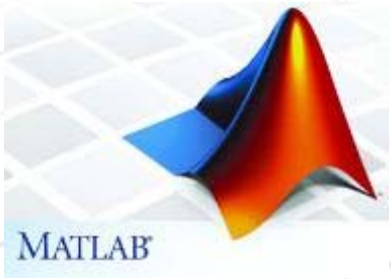


Discovery Workspace

- Data analysis tools: MATLAB, Jupyter notebooks

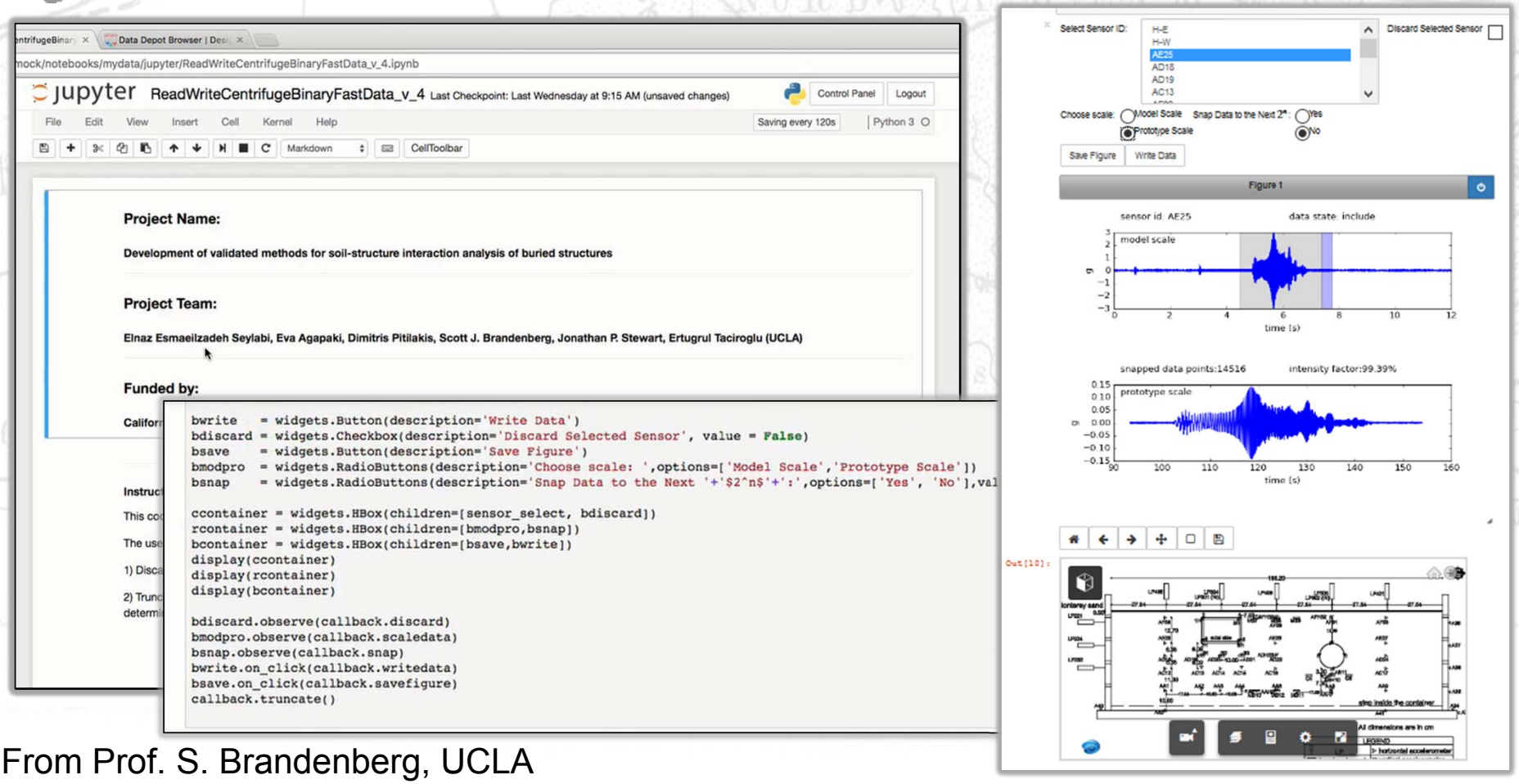


Data Processing in the Cloud



- MATLAB
  - Run processing scripts on data in the Data Depot
  - Access to HPC to process large data sets
- Jupyter Notebooks
  - Rich text, live code (Python, R), plots
  - Mechanism to share experimental data, processing scripts, etc.

Access to Experimental Data



From Prof. S. Brandenberg, UCLA

Sharing Analysis Scripts

jupyter 1GM_Sufficieny Last Checkpoint: 08/11/2016 (unsaved changes)

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Displacement hazard curves using scalar (PGA,

Summary:

This script demonstrates the displacement hazard calculation procedure using the Scalar (PG

Input

- GM hazard curve (MRE and PGA)
- Deaggregation (deag)
- Yield strength (ky)

Output

- Sliding diplacement hazard curve
- Sliding displacements with 10% and 2 probability of exceedance in the next 50 yrs (lambc

Reference: Rathje EM, Saygili G (2009) Probabilistic assessment of earthquake-induced slidir
42:18–27

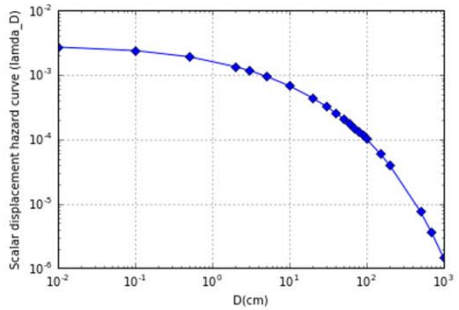
Import GM hazard curve (MRE and PGA) and Deaggregation (P[M|PGA)

In [38]:
```
import numpy as np
MRE = np.genfromtxt("MRE.csv",delimiter=None)
PGA = np.genfromtxt("PGA.csv",delimiter=None)
deag = np.genfromtxt("deag.csv",delimiter=",")
```

PGA hazard curve

In [39]:
```
#To enable plotting in the current notebook using Matplotlib
%matplotlib inline

import matplotlib.pyplot as plt
plt.semilogy(PGA, MRE, marker='D')
plt.title('Ground motion hazard curve')
```

In [47]:
```
lambda_D_plot = sum(sum(hazard))

#To enable plotting in the current notebook using Matplotlib
%matplotlib inline

import matplotlib.pyplot as plt
import pylab as p

plt.loglog(D_cm, lambda_D_plot, marker='D')
plt.grid(True)
plt.xlabel('D(cm)');
plt.ylabel('Scalar displacement hazard curve (lamda_D)');
```



In [48]:
```
T475 = lambda_D_plot  > 0.0021;
lambda_D_475 = D_cm[sum(T475)-1]
#-1 b/c first element ranking is zero

print ("Displacement level with 10% probability of exceedance in 50 years is", lambda_D_475, "cm")

T2475 = lambda_D_plot  > 0.0004;
lambda_D_2475 = D_cm[sum(T2475)-1]
#-1 b/c first element ranking is zero

print ("Displacement level with 2% probability of exceedance in 50 years is", lambda_D_2475, "cm")
```

```
Displacement level with 10% probability of exceedance in 50 years is 0.1 cm
Displacement level with 2% probability of exceedance in 50 years is 20 cm
```

From Prof. G. Saygili, UT-Tyler

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