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Quality Control for Next-Generation Liquefaction Case Histories

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NGL NEXT GENERATION LIQUEFACTION

Outline

- Introduction and project needs
- The Next-Generation Liquefaction (NGL) database
- NGL quality control and review process
- Vision for community access
- Final remarks

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NGL Project Contributors

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Others: Mike Greenfield, Teruo Nakai, Hideo Sekiguchi

What is a database?

Event Name	Magnitude	Epicentral Latitude	Epicentral Longitude	Station Name	V_{S30} (m/s)	R_{jb} (km)	PGA (g)
Westwood Hills	6.3	34.0689	118.4452	Factor Building	380	2	0.84
Westwood Hills	6.3	34.0689	118.4452	Santa Monica Courthouse	215	14	0.28
Hollywood Valley	7.2	34.1027	118.3404	Factor Building	380	20	0.61
Hollywood Valley	7.2	34.1027	118.3404	Santa Monica Courthouse	215	30	0.32

Event

Station

Ground Motion

Example database

Event Table 

Event_id	Event Name	Magnitude	Epicentral Latitude	Epicentral Longitude
1	Westwood Hills	6.3	34.0689	118.4452
2	Hollywood Valley	7.2	34.1027	118.3404

Primary Key

Foreign Key

Station Table 

Station_id	Station Name	V_{S30} (m/s)
1	Factor Building	380
2	Santa Monica Courthouse	215

Motion Table 

Motion_id	Event_id	Station_id	R_{jb} (km)	PGA (g)
1	1	1	2	0.84
2	1	2	14	0.28
3	2	1	20	0.61
4	2	2	30	0.32

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NGL Project Activities

1. Develop a publicly available **database of liquefaction case histories**.

2. Provide a coordinated framework for **supporting studies** to augment case history data for conditions that are poorly constrained by empirical data.

3. Provide an open, collaborative process for **model development** in which developer teams have access to common resources and share ideas during development.

The NGL Database

www.nextgenerationliquefaction.org

Database quality control

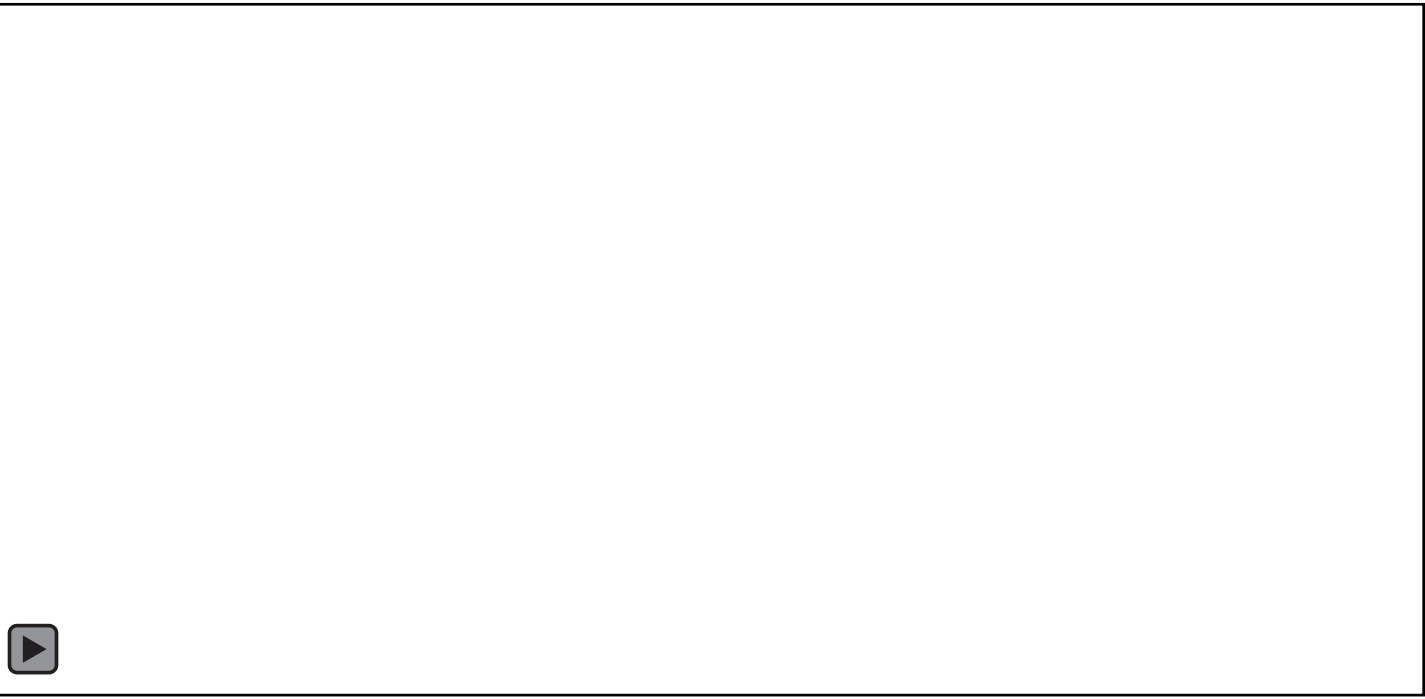
The **NGL database working group** oversees the database population activities and coordinates the formal process of reviewing NGL case histories.

Objective review:

- check that all required data fields are provided
- information provided is clear
- that the data are consistent with the original source

	Number
CPT Soundings	130
Boreholes	144
Surface Wave Measurements	9
Invasive Vs Profiles	33
Liquefaction Observations	133
Non-Liquefaction Observations	211

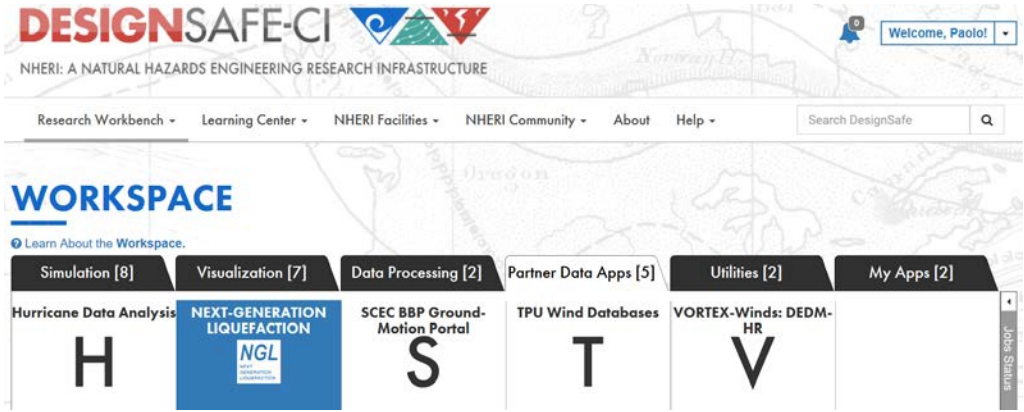
Database quality control – NGL GUI



Vision for community access to cloud or not to cloud?

- Due to **large amount of data**, downloading data and processing them on a laptop is inefficient and undesirable (still possible).

- The database is mirrored onto **DesignSafe** (www.designsafe-ci.org). Users will be able to process data on the cloud using SQL queries in Jupyter notebook Python scripts (*off-the-shelf* libraries).



Vision for community access

NGL Jupyter notebooks on DesignSafe

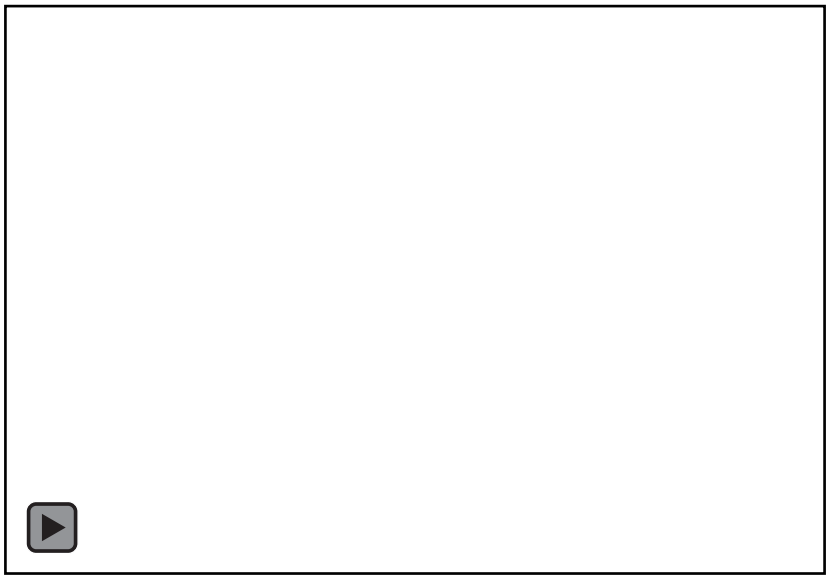
NGL Jupyter notebooks are all available in Community Data

https://jupyter.designsafe-ci.org

Vision for community access – CPT viewer

NGL Jupyter notebooks are all available in Community Data

https://jupyter.designsafe-ci.org



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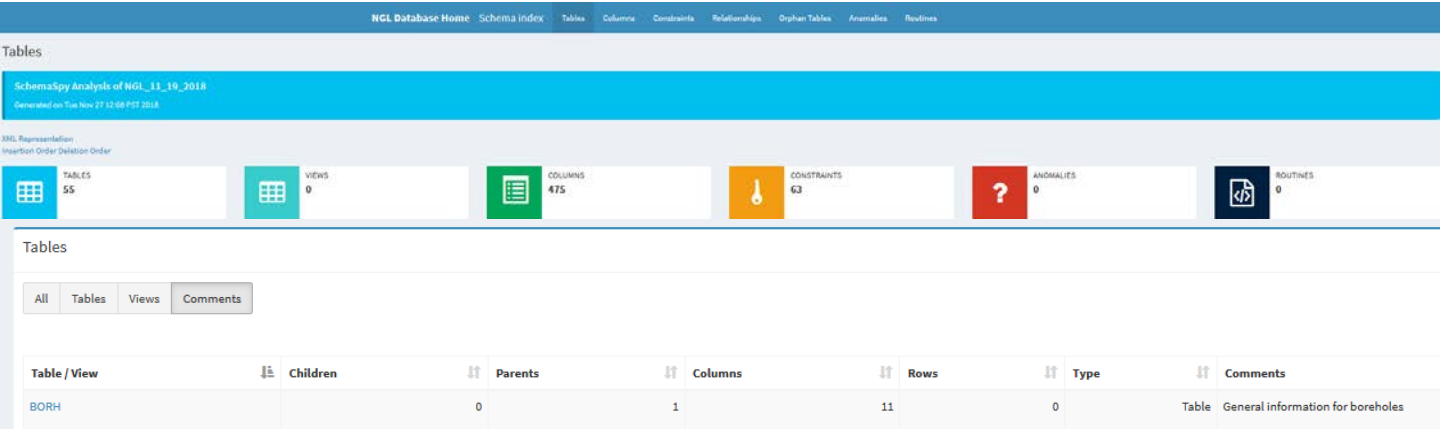
Need more details about the database?

Understand the NGL schema

Schema online dictionary: **http://nextgenerationliquefaction.org/schema/index.html**



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Conclusion

- NGL database (www.nextgenerationliquefaction.org): more than 300 case histories and counting
- Database working group is supervising a formal case history vetting process
- NGL database mirrored onto DesignSafe
- Big-data analytics capability via Jupyter notebooks and other tools

Thank you!
Questions?

Relevant References

Brandenberg S.J., Kwak D.Y., Zimmaro P., Bozorgnia Y., Kramer S.L., Stewart J.P. (2018). Next-Generation Liquefaction (NGL) Case History Database Structure. Fifth decennial Geotechnical Earthquake Engineering and Soil Dynamics Conference, Earthquake Engineering and Soil Dynamics Committee of the Geo-Institute. Austin, TX (USA), June 10-13.

Zimmaro P., Brandenberg S.J., Stewart J.P., Kwak D.Y., Franke K.W., Moss R.E.S., Cetin K.O., Can G., Ilgac M., Stamatakos J., Juckett M., Mukherjee J., Murphy Z., Ybarra S., Weaver T., Bozorgnia Y., Kramer S.L. (2019). Next-Generation Liquefaction Database. Next-Generation Liquefaction Consortium. DOI: 10.21222/C2J040.

Stewart J.P., Kramer S.L., Kwak D.Y., Greenfield M.W., Kayen R.E., Tokimatsu K., Bray J.D., Beyzaei C.Z., Cubrinovski M., Sekiguchi T., Nakai S., Bozorgnia Y. (2016). PEER-NGL project: Open source global database and model development for the next-generation of liquefaction assessment procedures. Soil Dyn. Earthquake Eng., 91, 317–328.

NGL
NEXT GENERATION LIQUEFACTION

Project homepage:
https://uclageo.com/NGL/

Database:
DOI: 10.21222/C2J040
http://nextgenerationliquefaction.org

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Thank you!
Questions?

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