

# Bay Area Geophysical Society Seminar Series



## Shear Wave-Velocity of Soil Liquefied During Earthquakes

**Dr. Robert Kayen**

Professor of Civil and Environmental Engineering  
at the University of California

**November 30<sup>th</sup>, 2023 5 PM PST -- Hybrid Talk**  
**In-person in room 325 McCone Hall (UC Berkeley campus)**  
**and on [Zoom](#)**

### Abstract:

The shear-wave velocity ( $V_s$ ) offers a means to determine soil's seismic resistance to liquefaction by a fundamental soil property. This talk will present the results of a decades-long international project to gather  $V_s$  site data and develop probabilistic correlations for seismic soil liquefaction triggering using shear wave velocity. The first correlation, published in 2013, analyzed 121 sites from the literature and 310 test sites we investigated in China, Japan, Taiwan, Greece, and the United States.



We are updating the initial correlation and have expanded the data set to approximately 650 sites, mainly through new testing of the M9.0 2011 Tohoku Earthquake, Japan, and the 2011 Christchurch and 2010 Darfield Earthquakes, New Zealand. Of critical importance, these new case histories occupy locations previously investigated by penetration testing. Bayesian regression and structural reliability methods facilitate a probabilistic treatment of the Vs catalog for performance-based engineering applications. Analysis of the uncertainties of the variables comprising both the seismic demand and the soil capacity is integral to the study and allows for the reduction of overall model error.

## Author:

Robert Kayen is a Professor of Civil and Environmental Engineering at the University of California, Berkeley, Adjunct faculty, and an Executive Committee Member of the Berkeley Center for Smart Infrastructure. He is President of Geosystems Engineering International, a California-registered engineering services corporation. He is a retired Senior Research Scientist from the United States Geological Survey, where he worked for four decades. Kayen has published over 400 Journal papers, Conference Papers, and Technical Reports in geotechnical earthquake engineering, TLS-LIDAR, InSAR, Structure-From-Motion, engineering geophysics, and marine-geotechnics. He is one of the founders of the National Science Foundation (NSF) sponsored Geotechnical Extreme Events Reconnaissance and has participated in over thirty extreme-event studies. Dr. Kayen has received honors that include the Middlebrooks Award from ASCE, the United States Department of Justice Commendation, and the NASA-Ames Honor Award.



## Zoom meeting information:

Zoom ID: 890 8233 5185

Password: BAGS4ever