

Evaluating Liquefaction Potential of Challenging Soil Sites Linking Geomorphological Controls and Novel Approaches for Site Characterization

RUSSELL A. GREEN¹

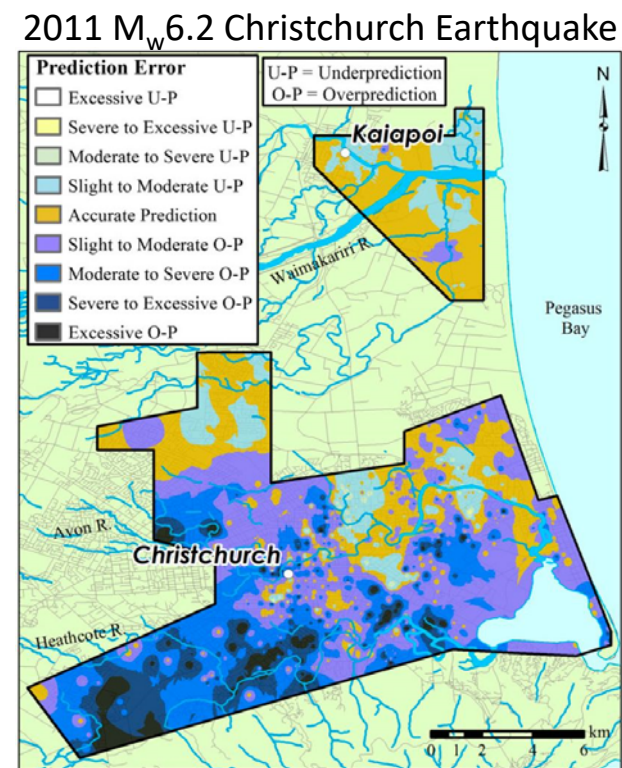
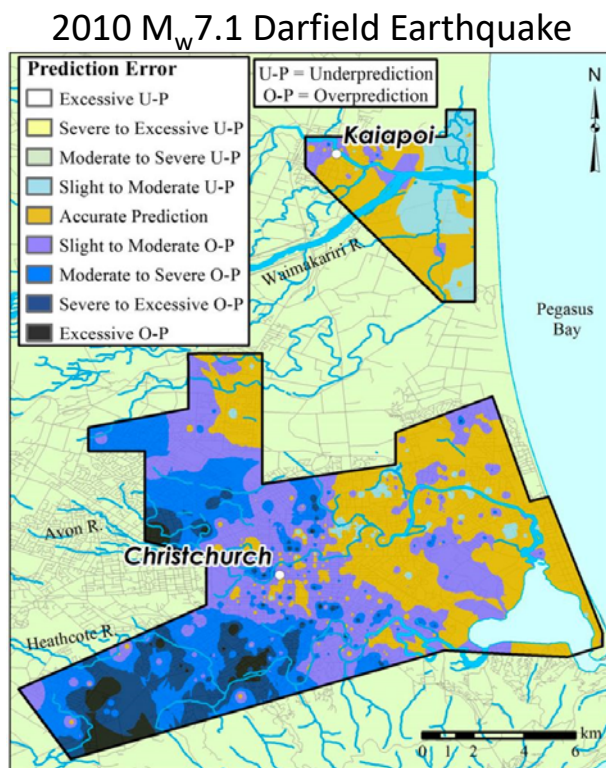
COLLABORATIVE RESEARCH PROJECT AMONG VIRGINIA TECH, UNIVERSITY OF MICHIGAN, AND QUAKECORE

¹Department of Civil and Environmental Engineering, Virginia Tech, Blacksburg, VA, USA

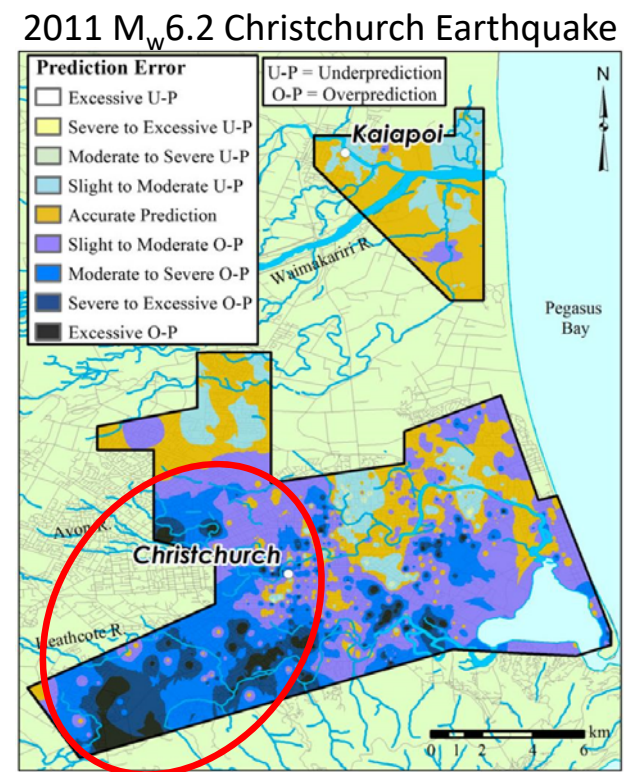
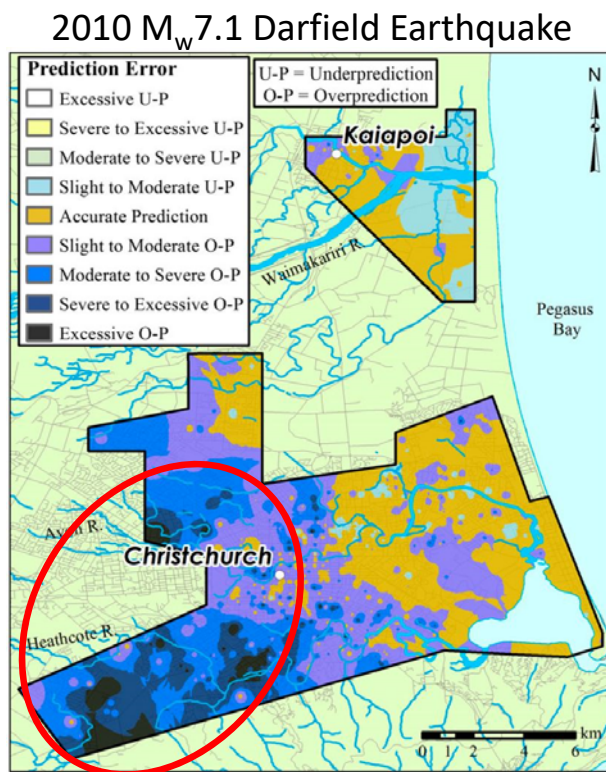
Outline

- Over-Predictions of Liquefaction Severity
 - relationship to geomorphology and profile characteristics
 - Influence of soil stratigraphy on:
 - surficial manifestation of liquefaction – geo-slicing
 - in-situ test metrics – VisCPT
- Research Plan

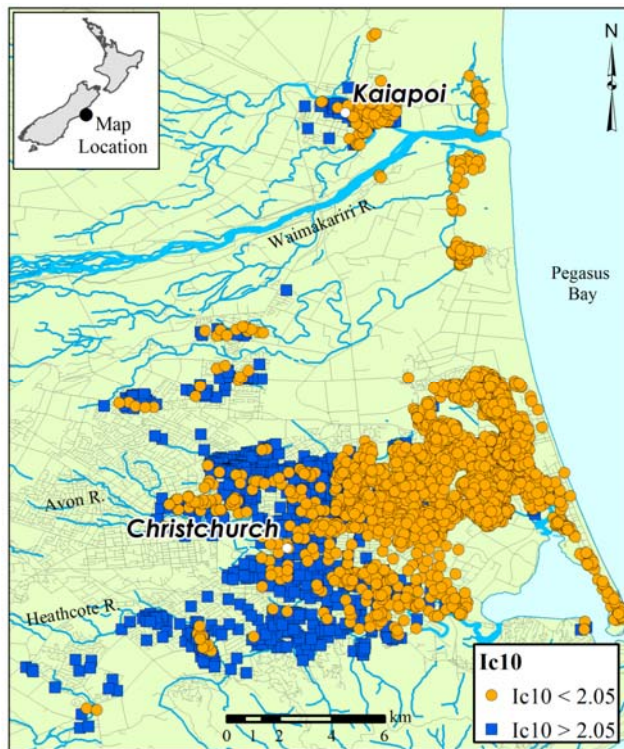
Over-Predictions of Liquefaction Severity



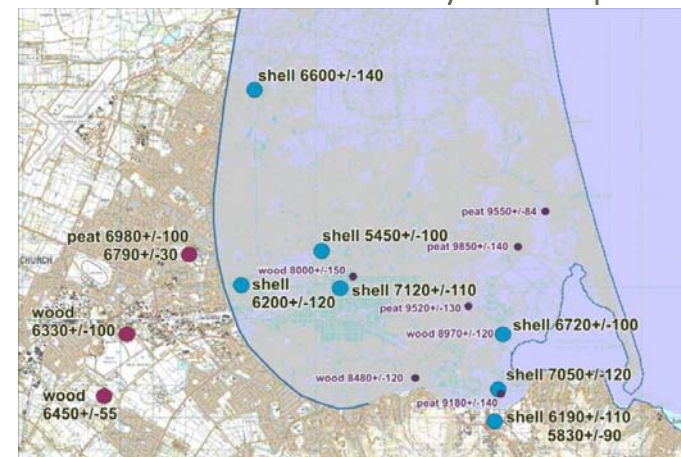
Over-Predictions of Liquefaction Severity



Over-Predictions of Liquefaction Severity relationship to geomorphology and profile characteristics

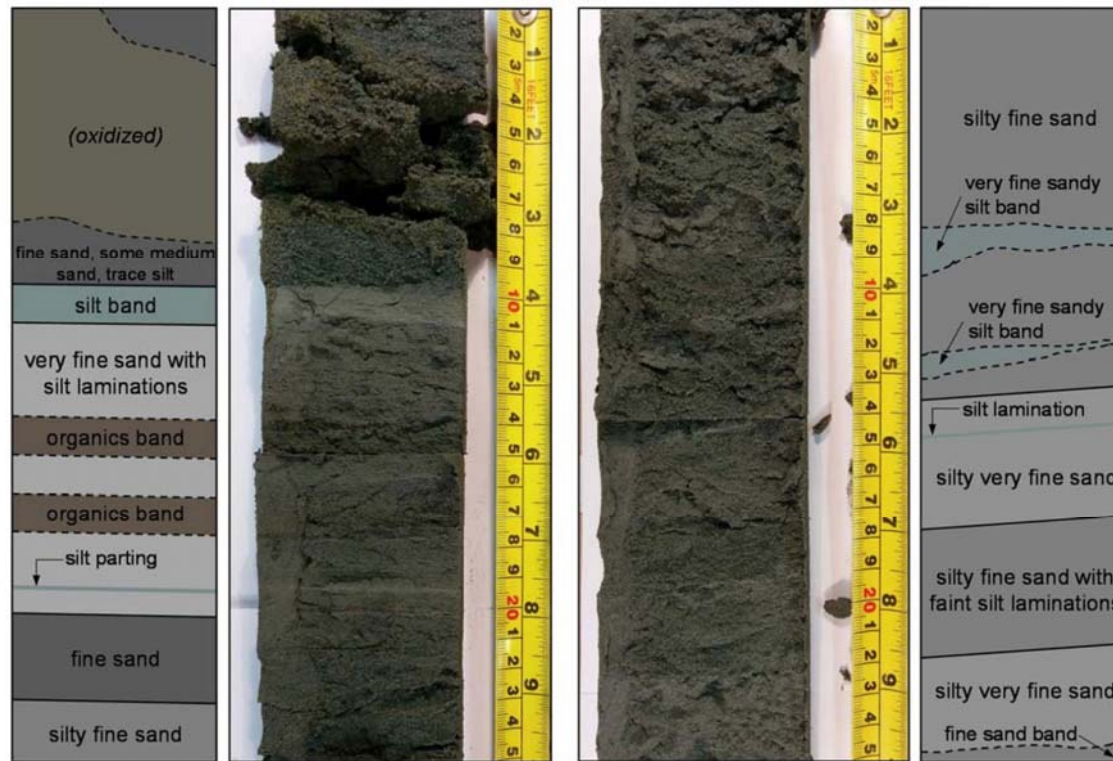


Shoreline ~6000 years bp



Over-Predictions of Liquefaction Severity

relationship to geomorphology and profile characteristics



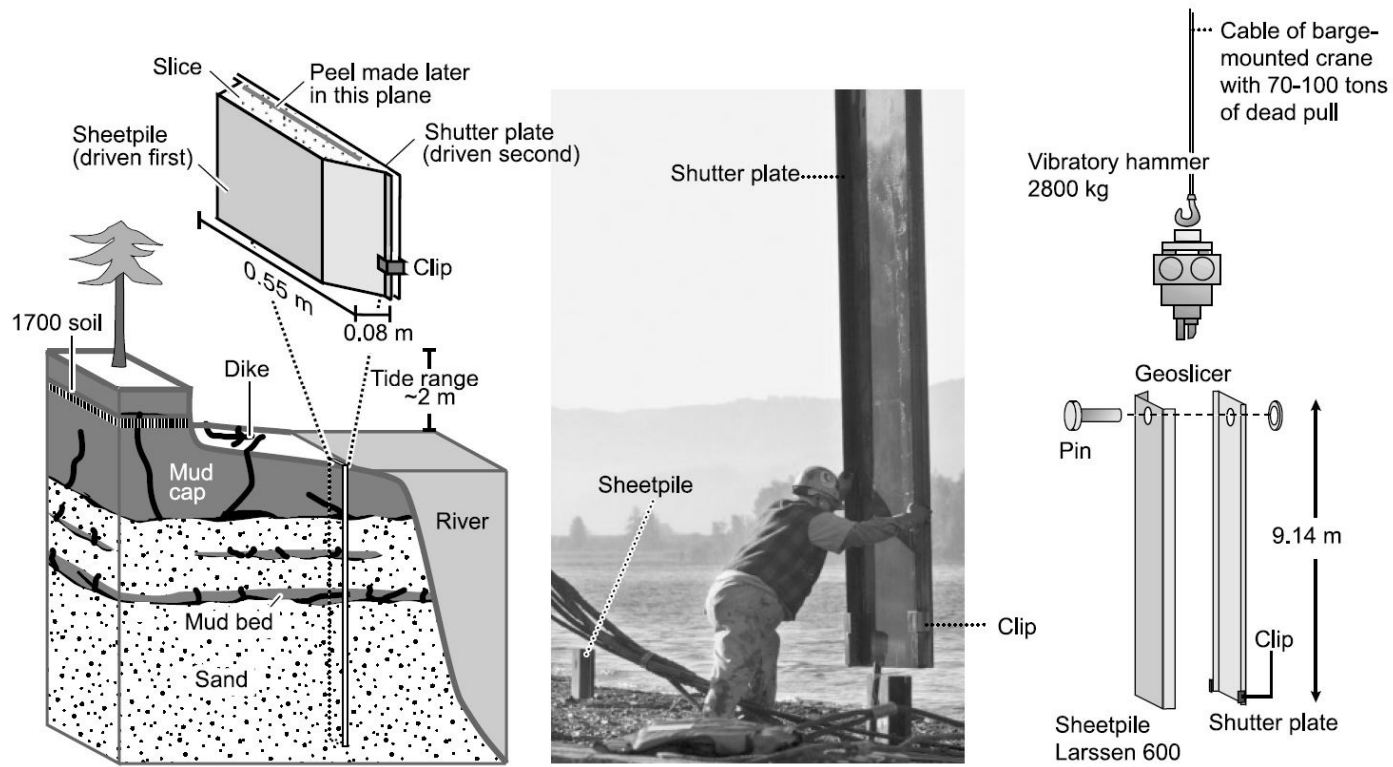
(Beyzaei et al. 2017)

Over-Predictions of Liquefaction Severity relationship to geomorphology and profile characteristics

□ Influence of soil stratigraphy on:

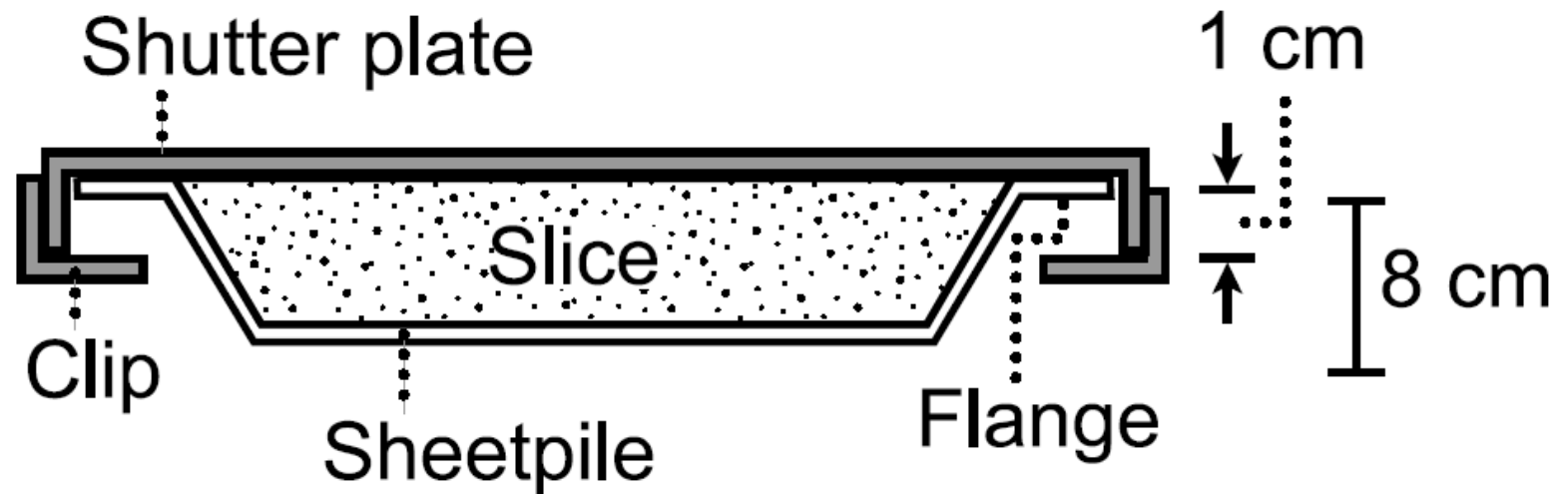
- surficial manifestation of liquefaction (i.e., did liquefaction trigger at depth, but did not manifest at the ground surface)
- in-situ test metrics (e.g., cone penetration tip resistance)

Influence of soil stratigraphy on surficial manifestation of liquefaction: "geo-slicing"

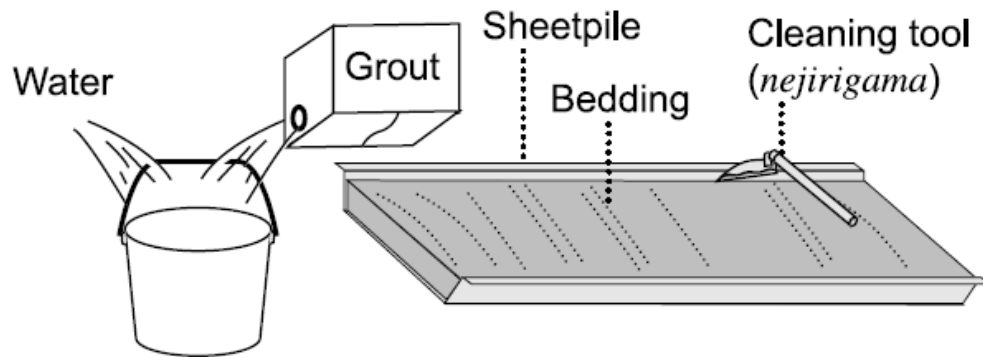


(Takada and Atwater 2004)

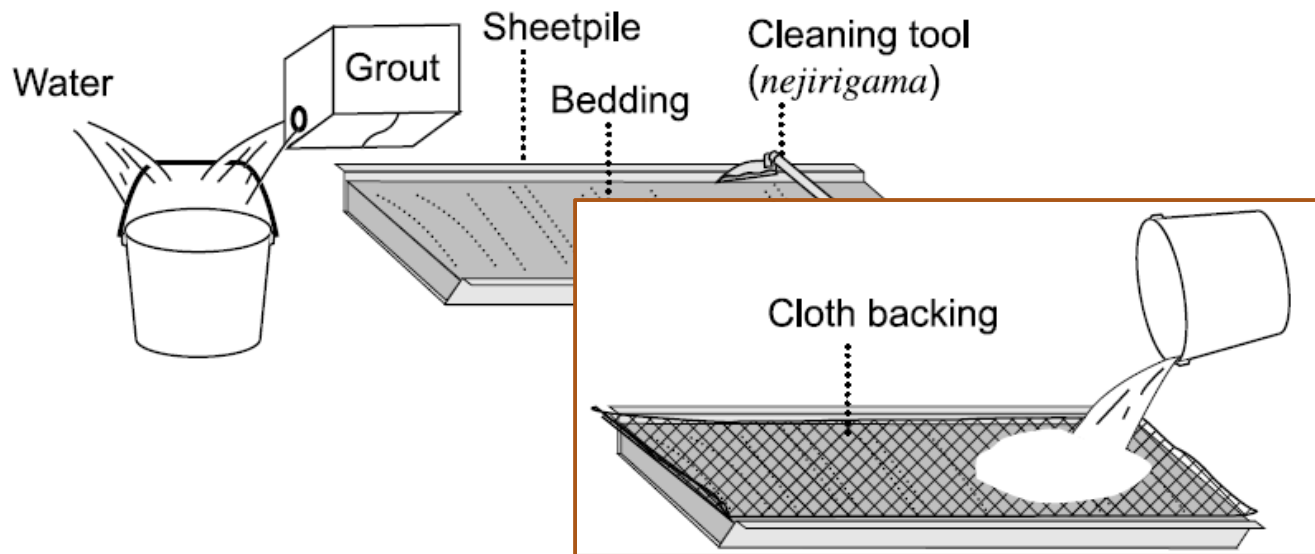
Influence of soil stratigraphy on surficial manifestation of liquefaction: “geo-slicing”



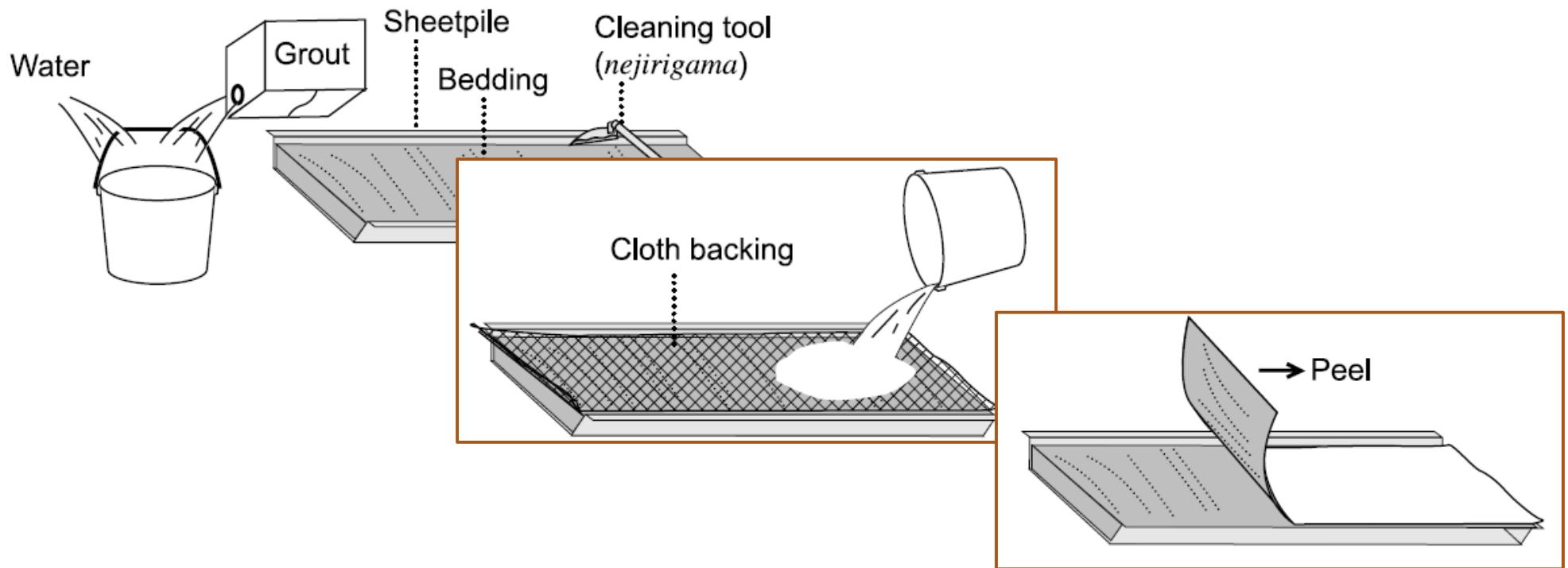
Influence of soil stratigraphy on surficial manifestation of liquefaction: “geo-slice peels”



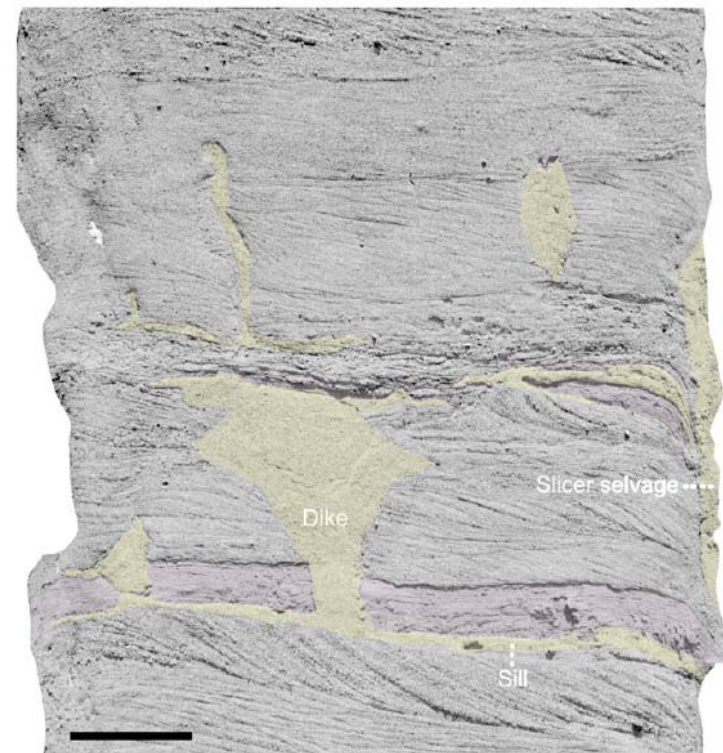
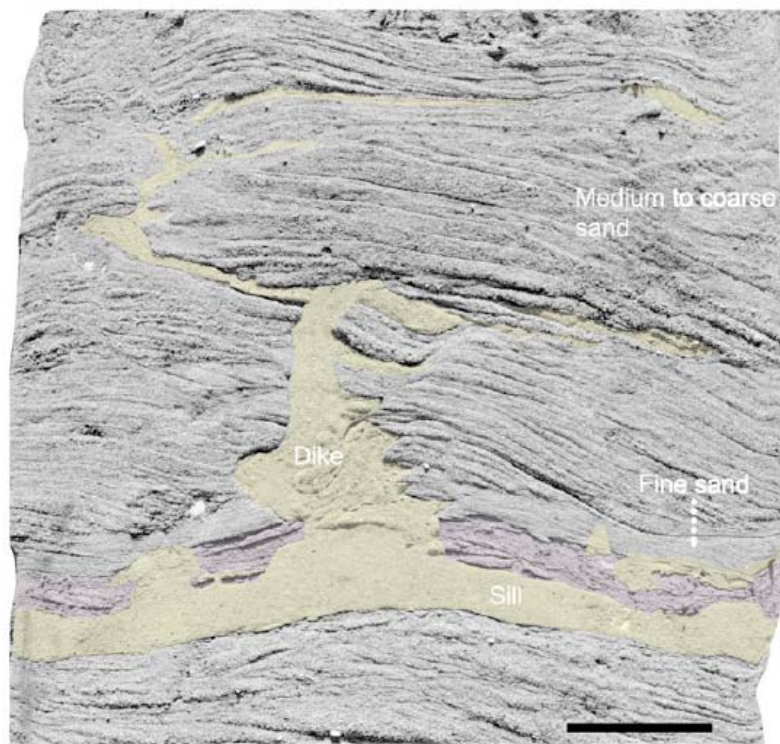
Influence of soil stratigraphy on surficial manifestation of liquefaction: “geo-slice peels”



Influence of soil stratigraphy on surficial manifestation of liquefaction: “geo-slice peels”

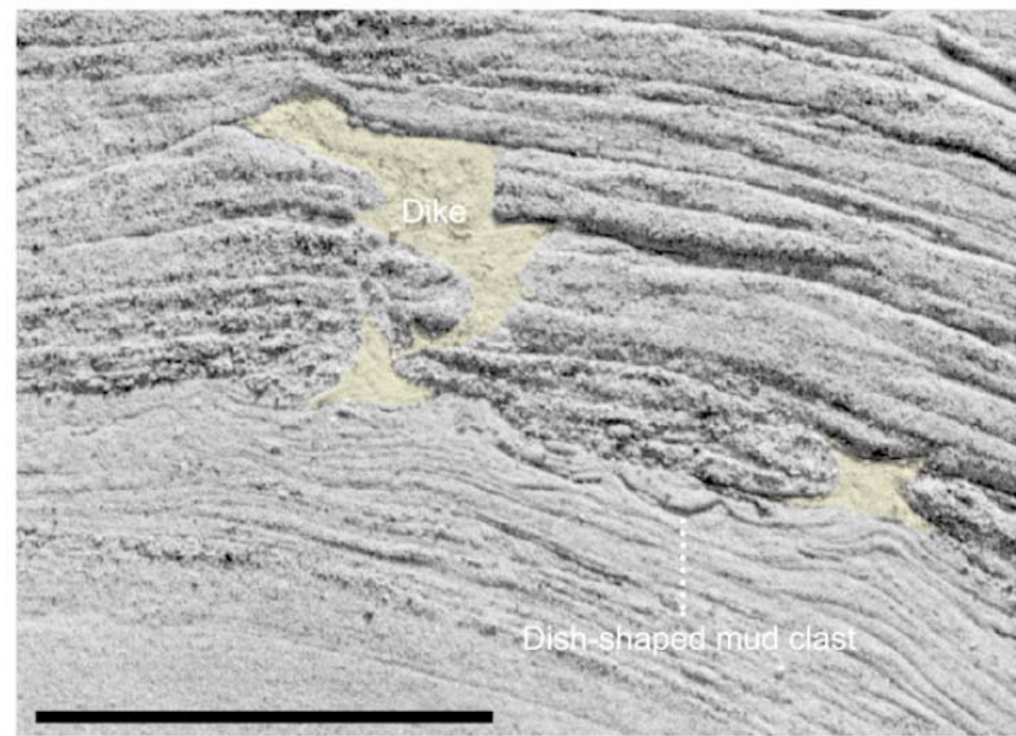
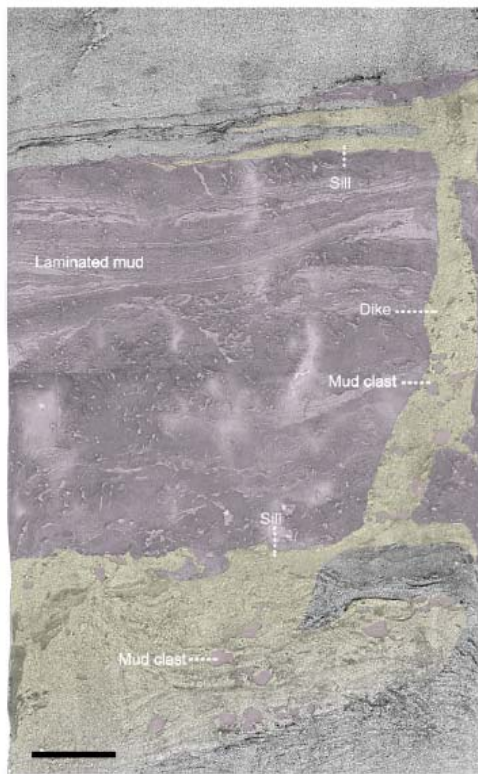


Influence of soil stratigraphy on surficial manifestation of liquefaction: “geo-slice peels”



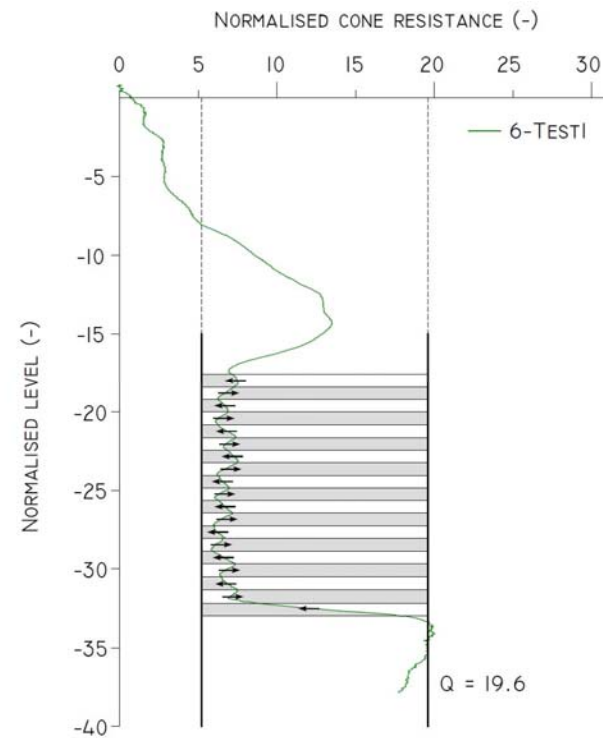
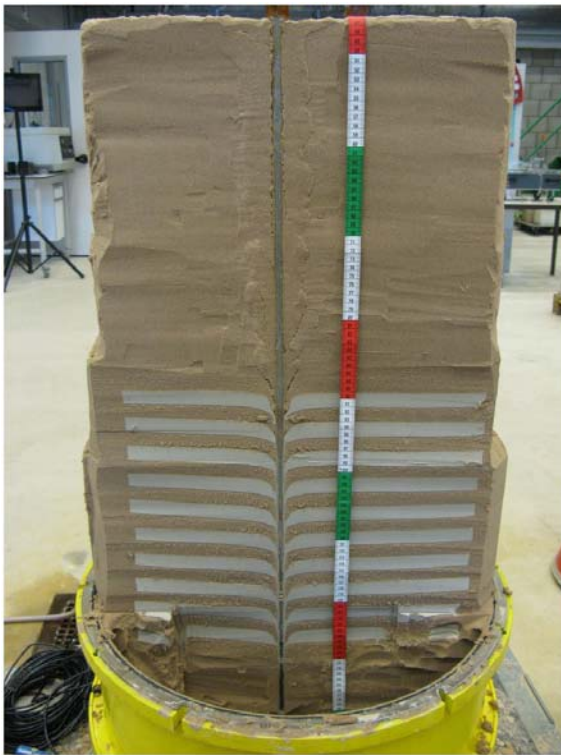
(Takada and Atwater 2004)

Influence of soil stratigraphy on surficial manifestation of liquefaction: “geo-slice peels”



(Takada and Atwater 2004)

Influence of soil stratigraphy on CPT tip resistance

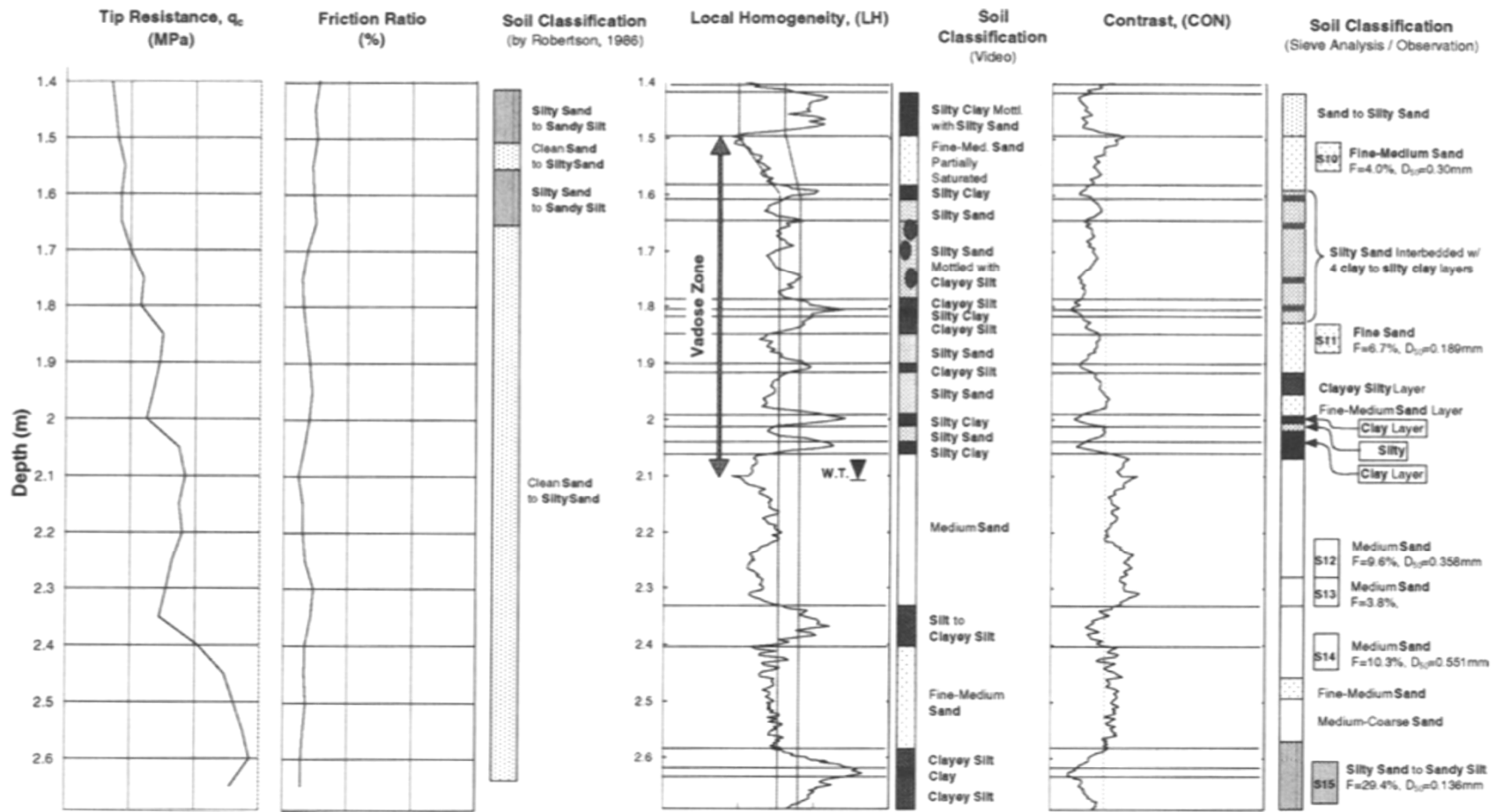


Site Characterization: Vision CPT (VisCPT)



(Courtesy of R. Hryciw)

Site Characterization: VisCPT



(Ghalib et al. 2000)

Site Characterization: Vision CPT (VisCPT)



(Courtesy of US ACE)

Over-Predictions of Liquefaction Severity

RESEARCH PLAN

The proposed research consists of the following five main tasks.

Task 1: Site Selection

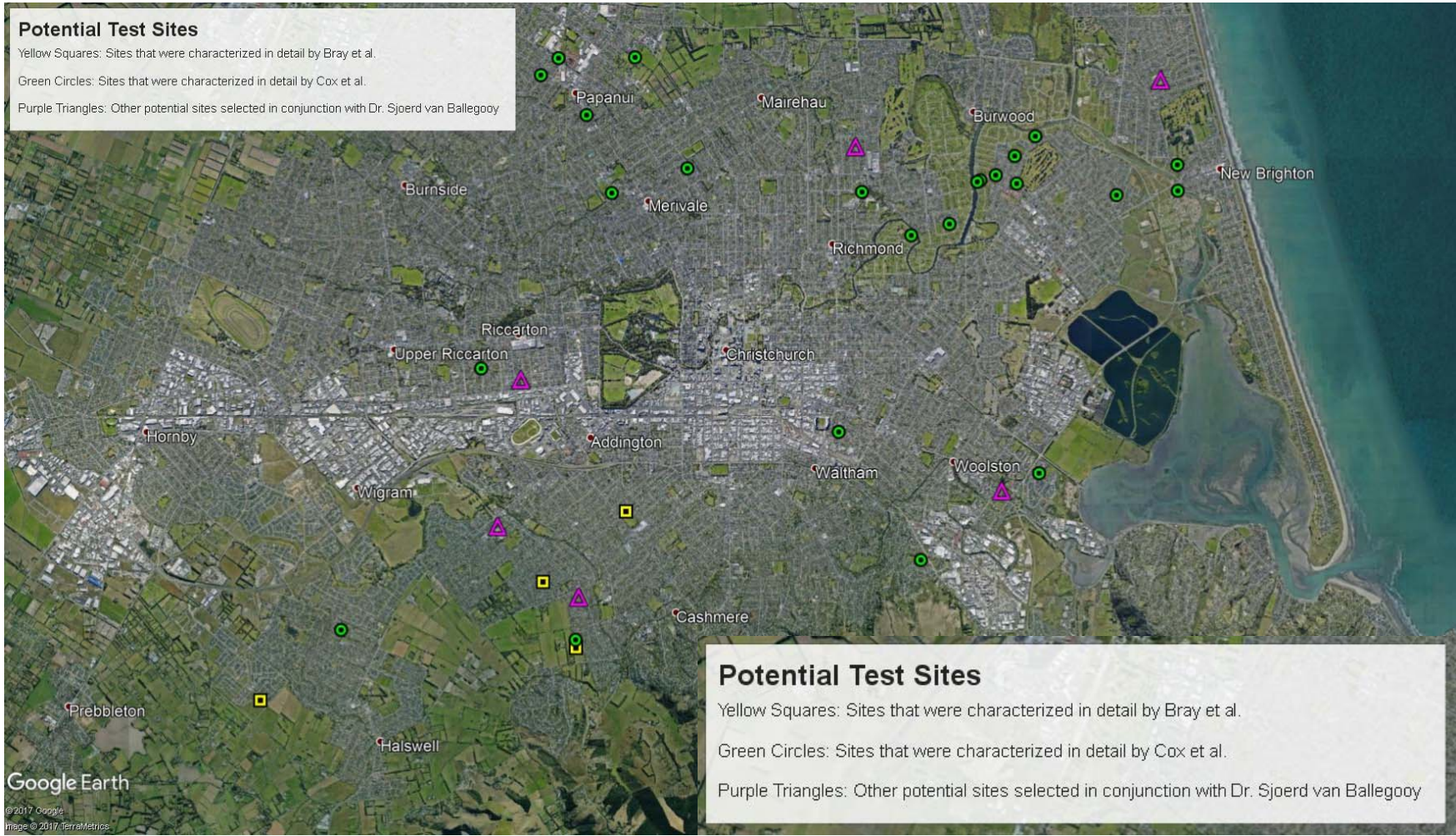
Task 2: Bringing the 3rd Generation VisCPT into Production Mode

Task 3: Field and Laboratory Testing

Task 4: Data Analysis

Task 5: Develop Procedure to Assess Liquefaction Damage Potential at Challenging Soil Sites

Potential Test Sites
Yellow Squares: Sites that were characterized in detail by Bray et al.
Green Circles: Sites that were characterized in detail by Cox et al.
Purple Triangles: Other potential sites selected in conjunction with Dr. Sjoerd van Ballegooy



Potential Test Sites
Yellow Squares: Sites that were characterized in detail by Bray et al.
Green Circles: Sites that were characterized in detail by Cox et al.
Purple Triangles: Other potential sites selected in conjunction with Dr. Sjoerd van Ballegooy

Google Earth
© 2017 Google
Image © 2017, TerraMetrics

Thank You

Questions???