EVALUATION OF LIQUEFACTION POTENTIAL OF PUMICEOUS DEPOSITS THROUGH FIELD TESTING

QuakeCoRE
NZ Centre for Earthquake Resilience
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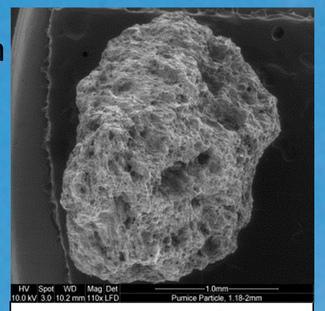
INTRODUCTION

Pumice materials are frequently encountered in many engineering projects in New Zealand. Because of their lightweight, highly crushable and compressible nature, they are **problematic** from an engineering and construction viewpoint.

However, there is very little information on the liquefaction characteristics of pumice deposits and most **empirical procedures** available for evaluating the liquefaction potential of sands are derived from hard-grained (quartz) sands.



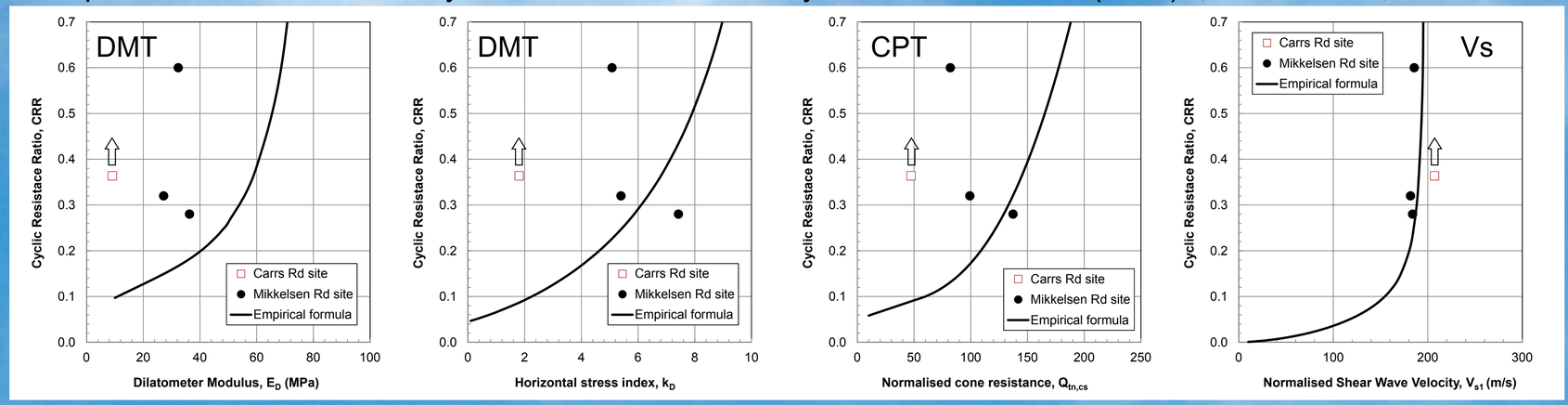
Pumice particle

RESEARCH OBJECTIVES

- To investigate the **liquefaction resistance** of in-situ pumice deposits **through field testing**, especially at sites where liquefaction have been observed following the **1987 Edgecumbe EQ**.
- Using simplified empirical methods employing **field parameters** (CPT, shear wave velocity, screw driving sounding), attempts will be made to explain the **occurrence/non-occurrence of liquefaction**.
- The **applicability of the field parameter(s)** and **current empirical approaches** in assessing **liquefaction potential of pumiceous deposits** will be scrutinized vis-à-vis current knowledge of the liquefaction characteristics of pumice sands.
- Based on the results, the field testing technique(s) that **best represent** liquefaction performance of pumice deposits would be determined.

RESULTS OF PREVIOUS RESEARCH

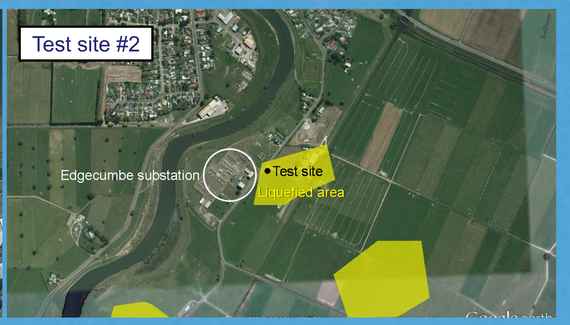
Comparison between laboratory-based and field-based cyclic resistance ratio (CRR): (after Orense et al. 2012)



- *Observation:* Penetration-based methods **do not correlate well** with the laboratory-obtained CRR.
- *Hypothesis:* The shear stresses during penetration were so severe that **particle breakage** formed new finer grained materials, the mechanical properties of which were very different from the original pumice sand.

METHODOLOGY & PROPOSED TEST SITES

- **Identify target sites** within the Rangitaki Plains where liquefaction had been observed during the 1987 Edgecumbe EQ.
- **Perform field testing** (CPT, Vs-profiling and SDS testing) at the designated sites, as close to each other as possible.



- **Estimate the peak ground accelerations** and **ground water table profiles** at the said sites using available information.
- **Perform liquefaction potential evaluation** using available empirical methods.
- **Compare the observation** with the results of the empirical analysis, and **provide recommendation** on the field parameter(s) that best reflect the observed occurrence/non-occurrence of liquefaction.

ACKNOWLEDGEMENT

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