

Geotechnical Hazard Research:

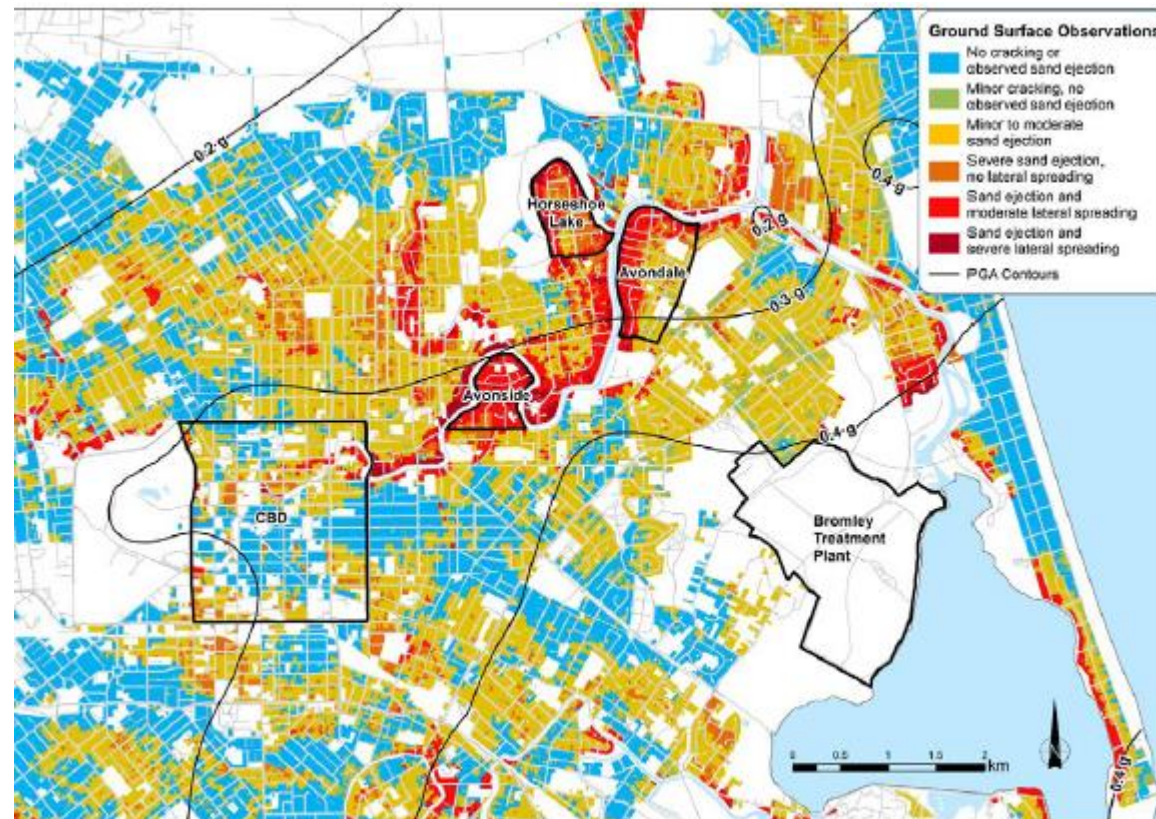
Integration of Geospatial and Focussed Liquefaction Tools for Regional Assessments

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Background

- The devastating impacts of soil liquefaction to residential houses and engineering structures following the 2010-2011 Canterbury earthquake sequence (CES) compelled many regional and city councils to assess their own sites' **vulnerability to liquefaction** during future earthquakes.



(after van Ballegooy et al. 2014)

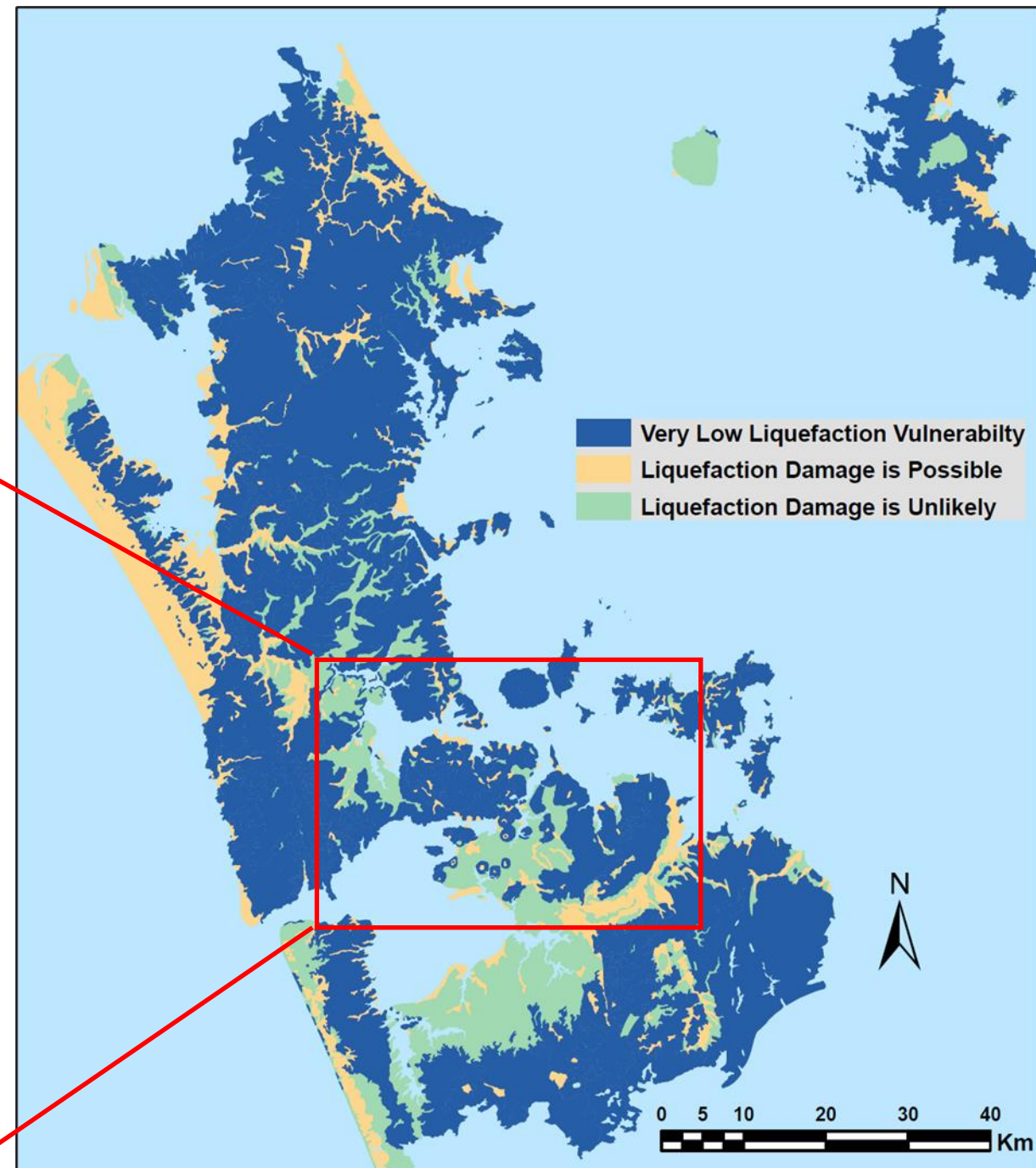
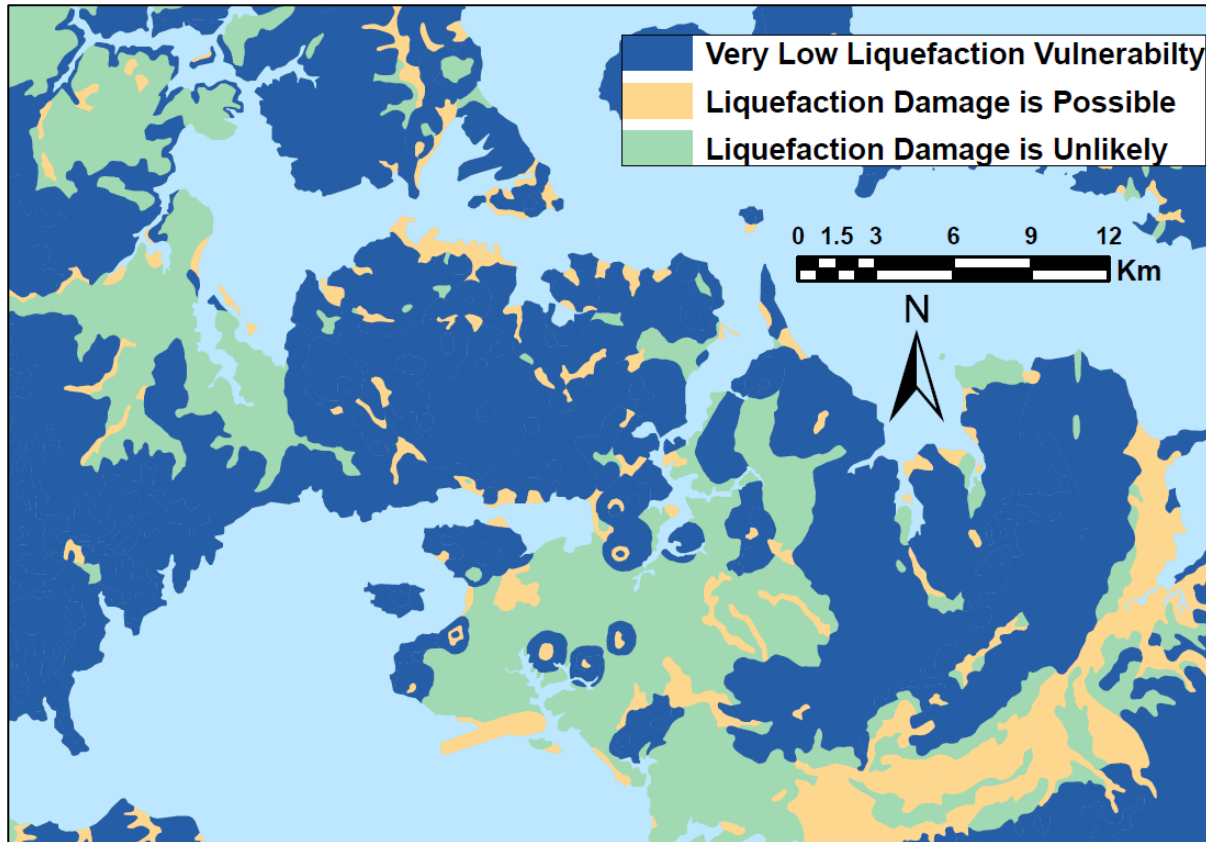
Liquefaction Mapping Procedures

- Geology- and geomorphology-based surface mapping
- Semi-empirical-based geotechnical approaches
- Logistic regression-based geospatial techniques

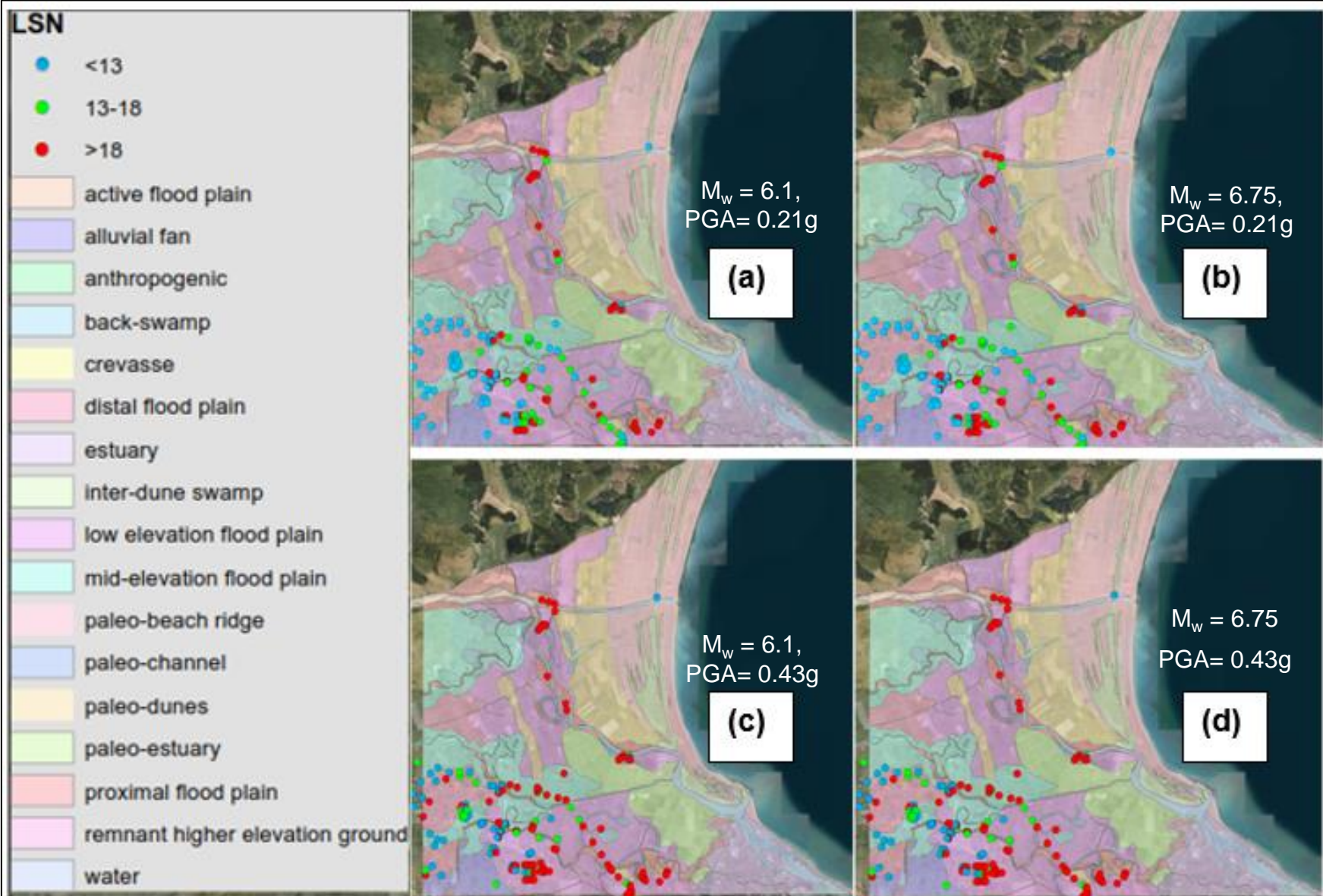
Site-specific geospatial parameters, such as site elevation, distances from rivers, surficial geology, etc. play a major role in defining the severity of liquefaction-induced damage.

Geology-based Liquefaction Vulnerability Maps for the Auckland Region

(after Altaf et al. 2020a)

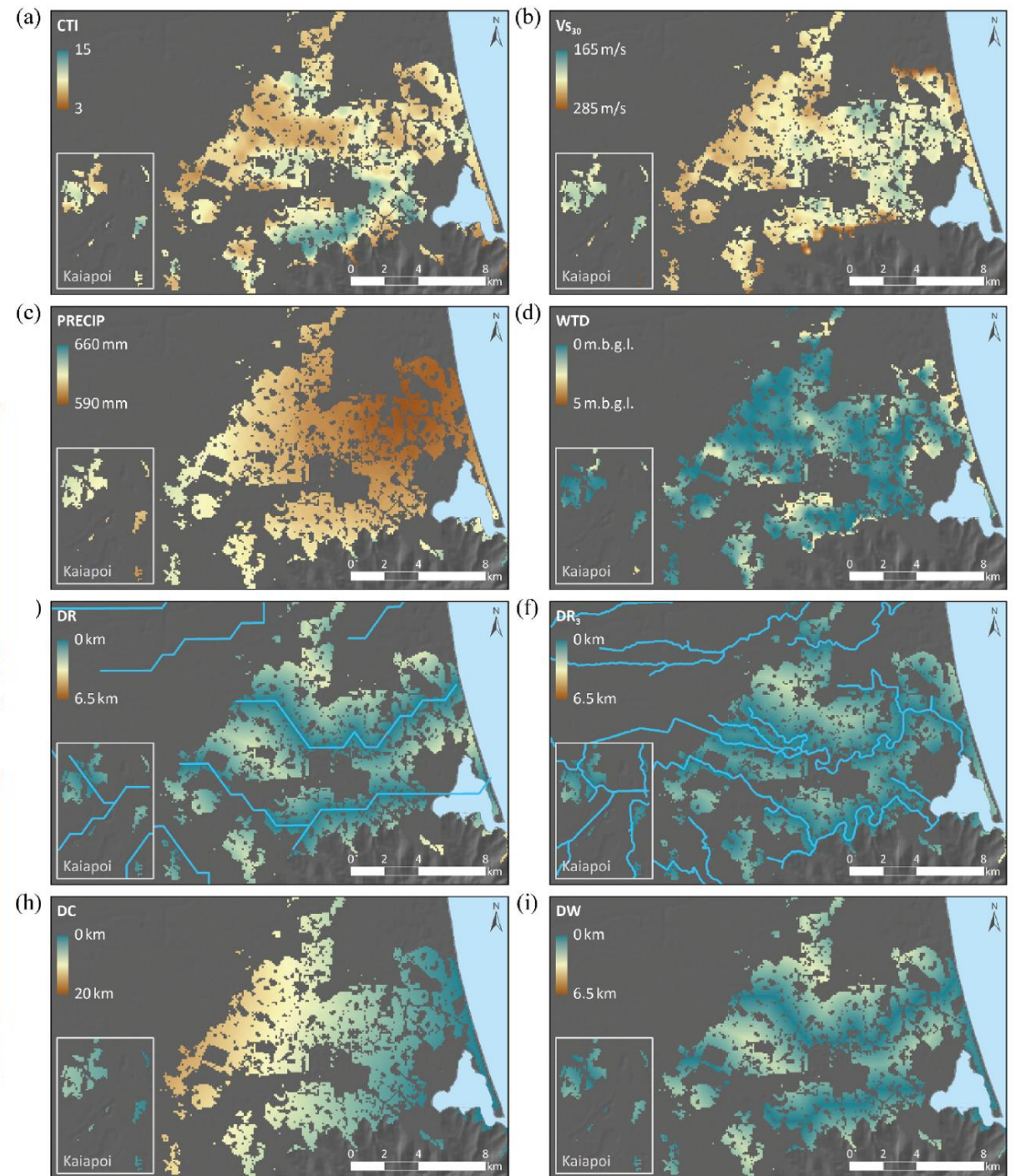
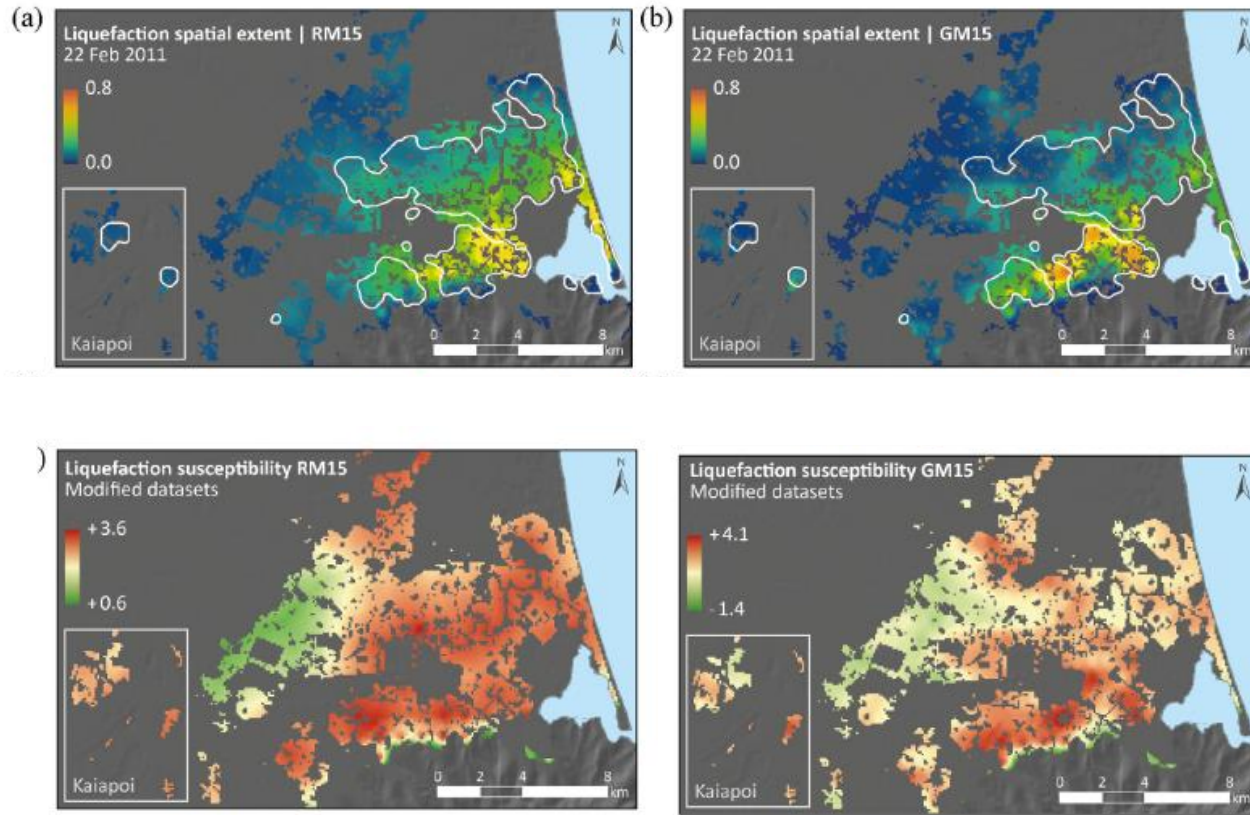


Geotechnical-based Liquefaction Vulnerability Maps for the Lower Wairau Plains (Marlborough Region) (after Altaf et al. 2020b)



Geospatial Liquefaction Models

(after Lin et al. 2021)



Project Objectives

- This project will attempt to **integrate geospatial data** and **available liquefaction tools** to develop **robust models** not only for assessing **liquefaction extent in a region** but also the **severity of liquefaction-induced damage**.
- Moreover, common **ground motion intensity measures** (e.g. PGA, PGV, SI, etc.) will be examined to identify the most applicable intensity measure to use.
- While the models will be largely based on the data and **lessons from CES, other problematic soil deposits** in NZ, such as:
 - the **pumice-rich deposits** in central North Island
 - the **gravelly soils** in Blenheim (Marlborough Region)
- Recommendations on the use of the model to **wider NZ setting** will also be formulated.

(Potential) Stakeholders/end-users

- Ministry of Business, Innovation and Employment (MBIE)
- Waka Kotahi NZ Transport Agency
- Regional/City/District councils
- Consulting and professional engineers
- etc.

PhD Student

- Currently stuck overseas

Watch this space!