Next-Generation Liquefaction (NGL) Case History Database Structure

PEER Next-Generation Liquefaction Research Program

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Introduction

The Next-Generation Liquefaction (NGL) project is a multi-year community-based effort consisting of three components:

(1) **A transparent, open-source, community database of liquefaction case histories.** Its development is overseen by the **NGL Database Working Group** consisting of S. J. Brandenberg (chair), K. Onder Cetin, Kevin W. Franke, and Robb E.S. Moss;

(2) **Supporting studies** for effects that should be captured in models but that cannot be constrained by case history data;

(3) **Model development**.

The NGL case history database that is accessible via a web interface at http://www.uclageo.com/NGL/ (Figure 1). Registered users can upload, view, and download data. The NGL database is a **relational database (RDB)**, which differs from what many in the natural hazards community intend when they use the term "***database***". The NGL RDB is a collection of **objective data**. This is different from a **flatfile** that contains **subjective interpretation** of them.

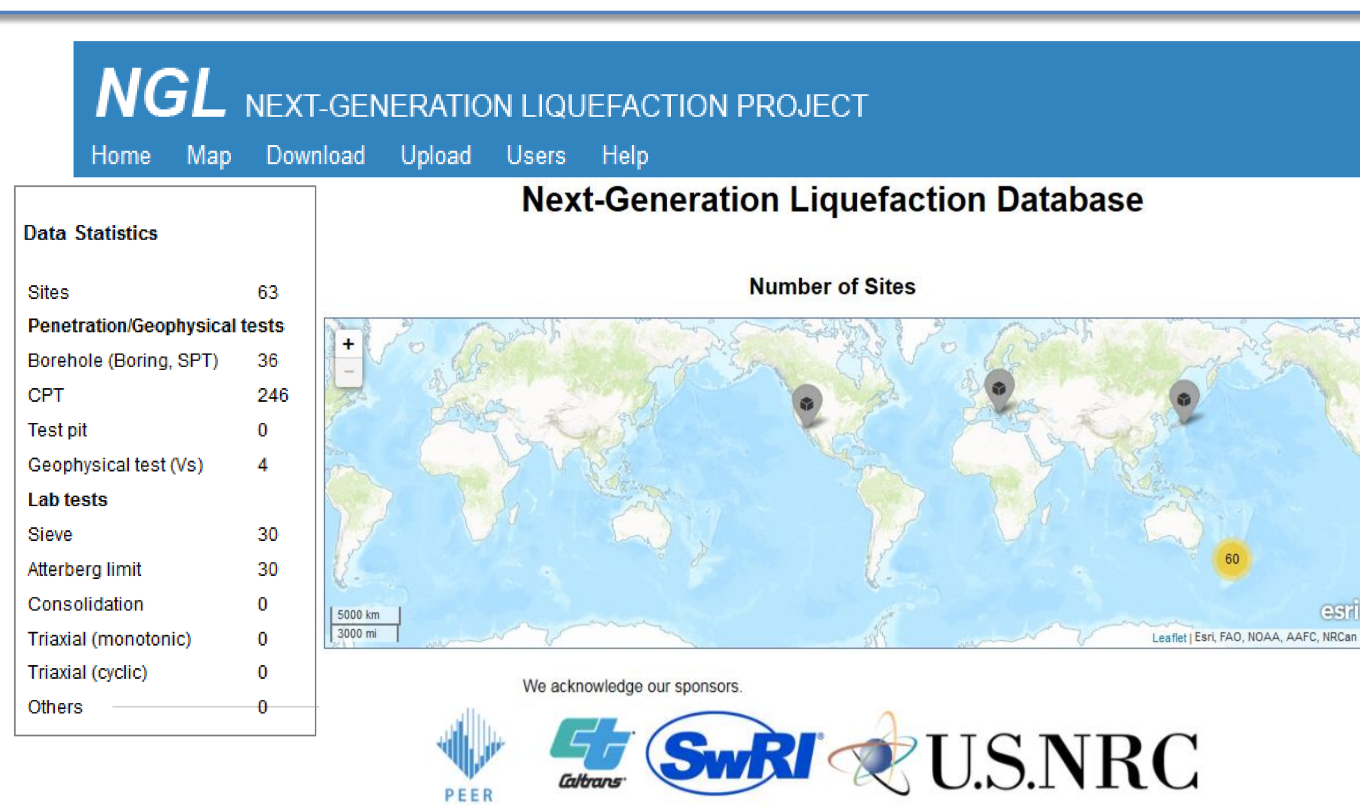

Figure 1. Screenshot of the NGL database homepage.

NGL Database Structure

In NGL, a case-history consists of three components:

(1) **Site** (Geotechnical/geological site characterization, Figure 2);

(2) **Event** and ground motion information (Figure 3). This section mirrors in some respects the data structure used in the **NGA-West2** and **NGA-Subduction** projects;

(3) **Observation**, including evidence for liquefaction and its effects, ground failure, or non-ground failure (Figures 4 and 5).

The NGL database structure is described by the **database schema** (Figure 6) which represents the blueprint of how the database is constructed. Its current version has been refined through a **community-based** effort performed in the last two years via **project coordination meetings** and **public workshops**.

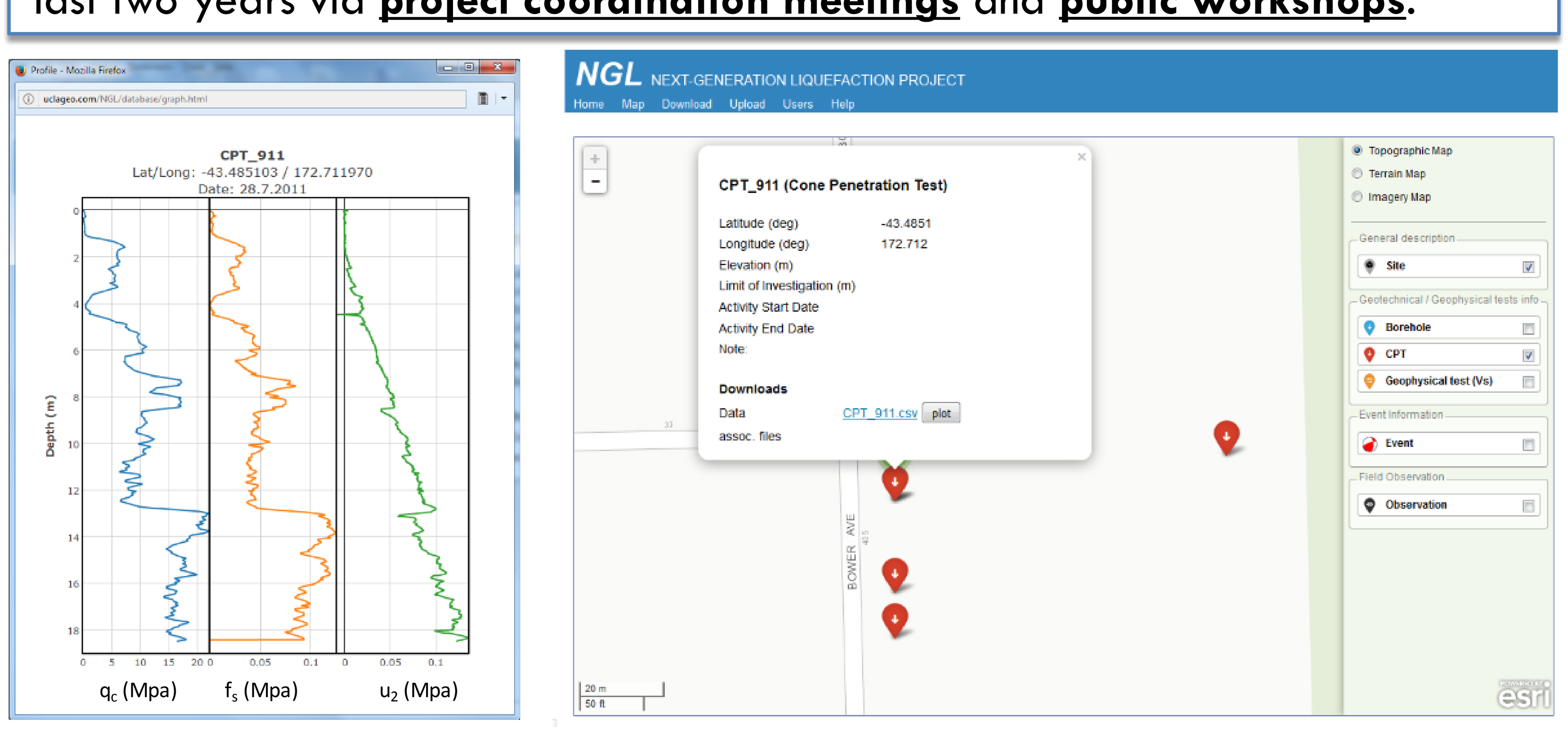

Figure 2. Site characterization and example of the NGL RDB plotting capability.

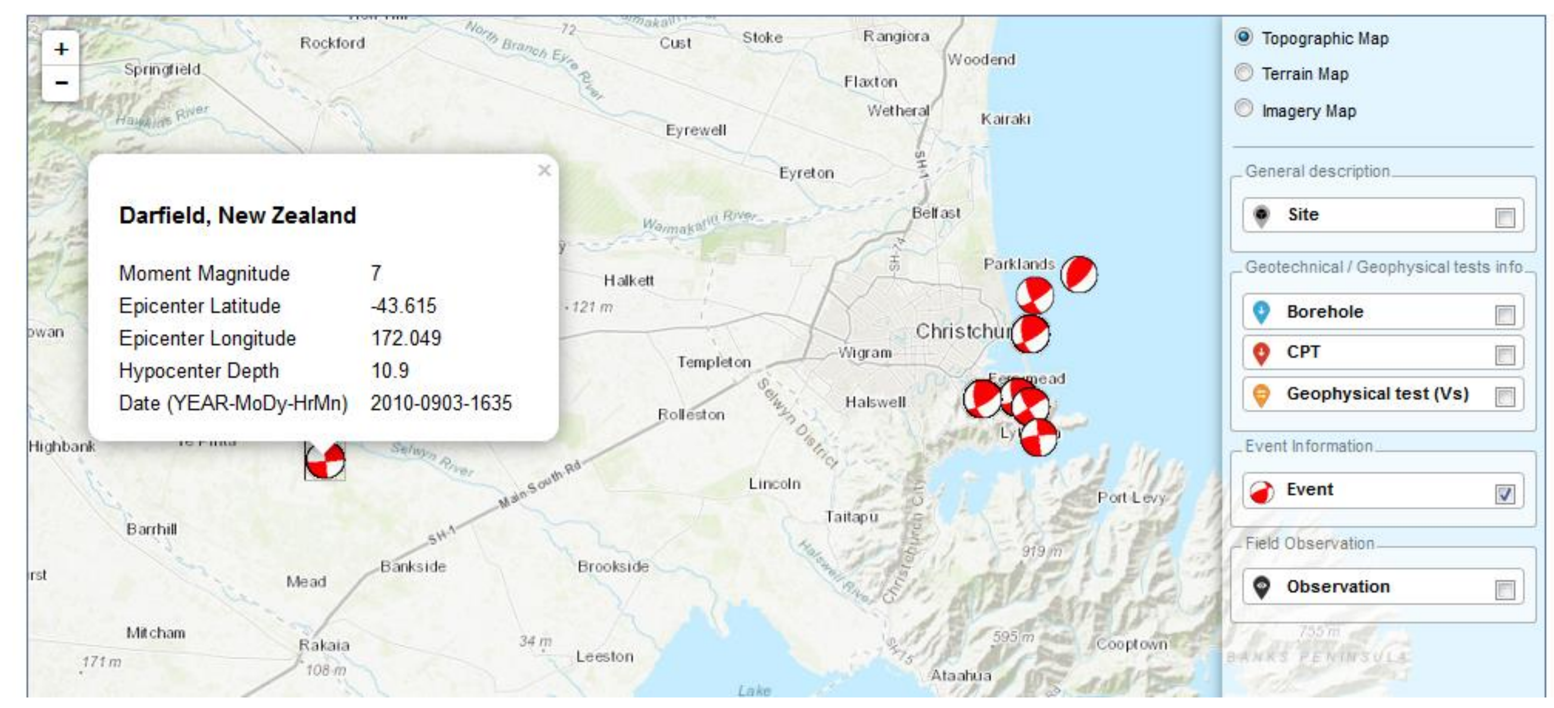

Figure 3. Screenshot of the NGL database event section for the Christchurch area in New Zealand.

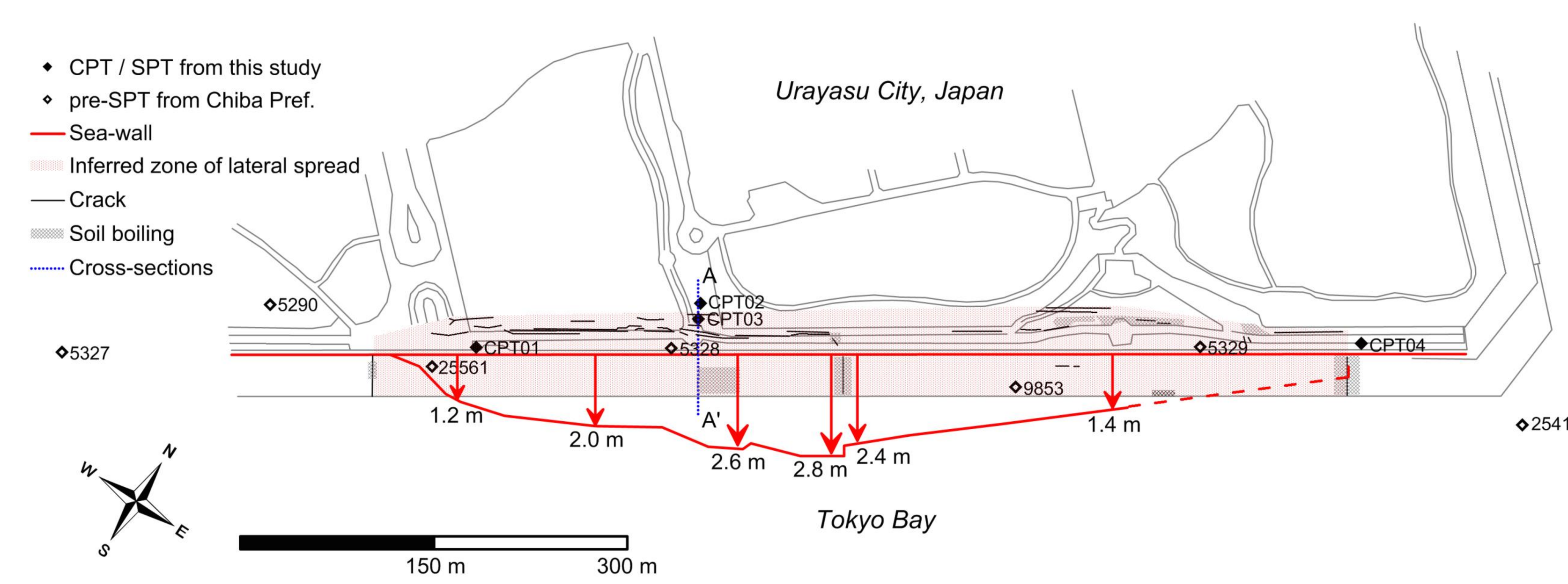

Figure 4. Observed field performance (deformation map) for the Urayasu sea-front case-history in Japan following the 2011 **M**9.0 Tohoku-Oki event.

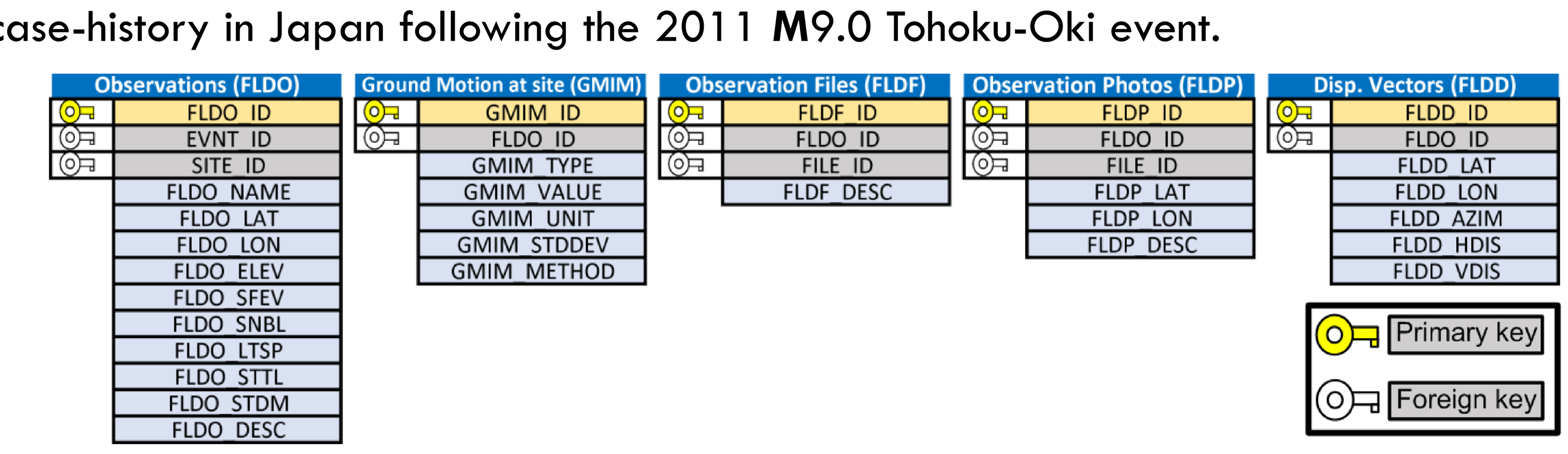

Figure 5. NGL relational database structure for post-earthquake observations.

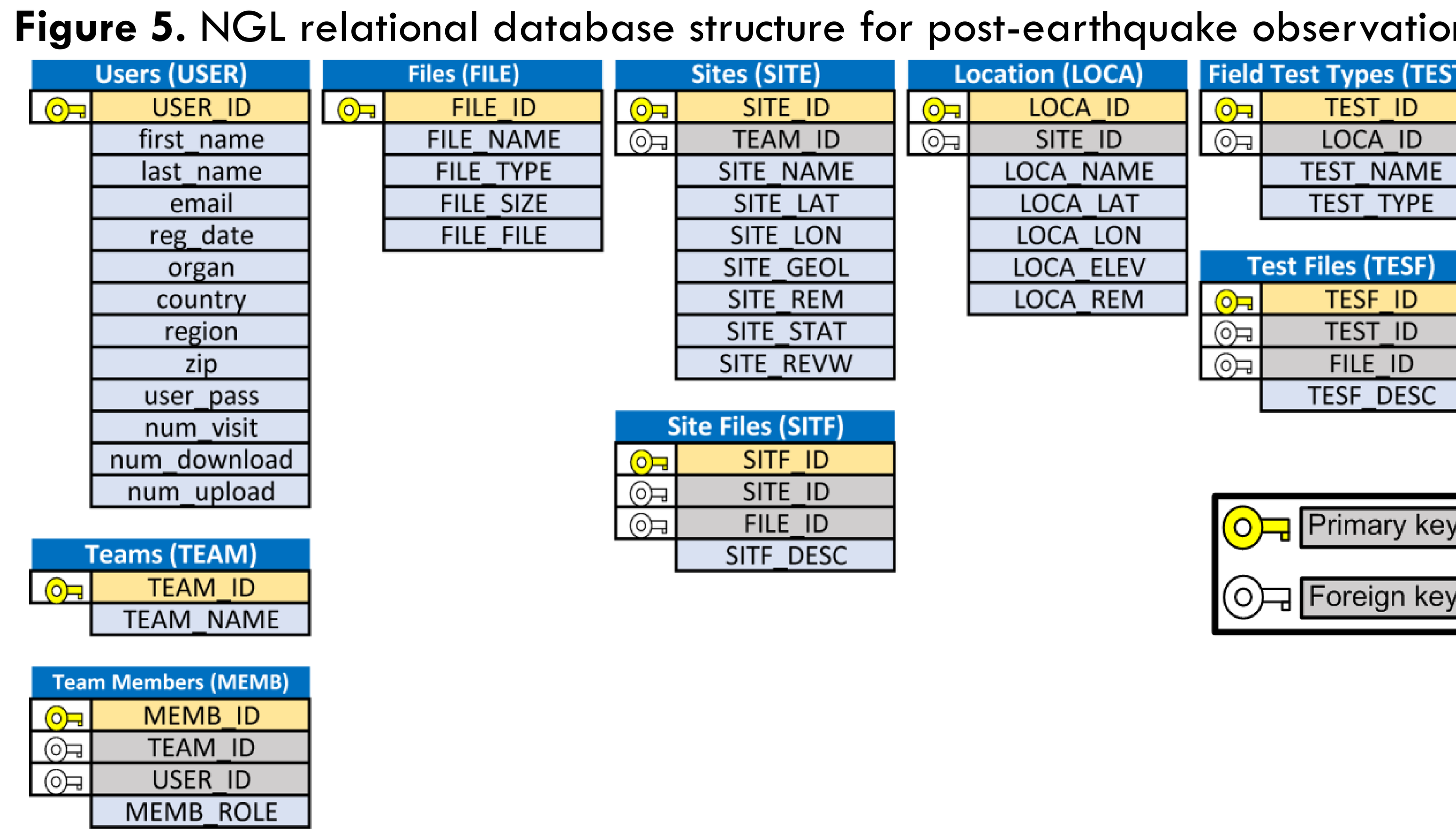

Figure 6. NGL relational database structure for general information.

Conclusion

This poster presents the **organizational structure of the NGL relational database** by providing a list of tables, fields within those tables, and relationships among the tables. The adoption of a relational database management system is a departure from the more common file repository approach adopted by many engineers in the natural hazards community. The use of a RDB provides significant benefits over traditional file repositories.

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